

# **Bibliography of CNA Manpower Work: Marine Corps Focus**

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with  
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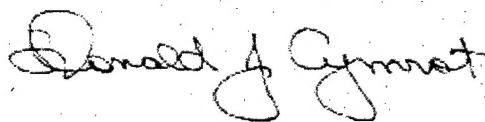


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April 2002



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Resource Analysis Division

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## Careers/Promotions/Advancement

### Marine Corps

CRM 2799011400/Final Unclassified

*Officer and Enlisted Accession and Retention Study Issues* (U) November 1999

AO Quester, AM Adedeji, CS Moore, CM Hiatt

101 pp. CNA, RAD, Repository

(U) The Officer and Enlisted Accession and Retention study address four issues Manpower and Reserve Affairs identified as needing further research and analysis to help the Marine Corps most cost-effectively man its force. The first issue explores first-term and career force mix, looking at the experience mix within the first-term force and changes in the force mix for particular Occfields. The second issue examines Basic Electronic Course qualification scores, looking at the impact of the lower cutoff score on performance. The third issue evaluates the Prior-Service Enlistment Program, comparing attrition rates of PSEP Marines and on-prior-service-first-termers. It also evaluates the success of the program in filling occupational shortages in the Corps. The final issue evaluates the cost and retention effectiveness of the Marine Corps' aviation bonus program, focusing on what bonus levels are needed to meet retention goals in each officer community.

CRM 2795005500/Final Unclassified

*Successful Officer Careers: Analysis of Augmentation, Promotion, and Voluntary Continuation* (U) August 1995

JH North, DD Goldhaber, KS Lawler, JN Suess

132pp, CNA, SPM, Repository, Paper

(U) The Marine Corps and the Department of the Navy have a strong interest in improving the opportunities for minorities and women. In July 1993, the Marine Corps established a Quality Management Board (QMB) to analyze the way the Marine Corps accesses, trains, educates, assigns, augments, promotes, and develops Marine officers. In particular, the focus is on the success of minorities and women. The QMB's goal is to improve success rates for women and minorities where they lag behind other officers. This objective is consistent with the plan announced by Navy Secretary John Dalton. Specifically, by the year 2000, the Marine Corps is to reach an accession goal of 12 percent black officers, 12 percent Hispanic officers, and 5 percent 'other' minorities. These goals are roughly double the FY 1994 goal of about 7 percent black, 5 percent Hispanic, and 3 percent other minorities. The desired effect of these moves is to make the officer corps 'look more like America,' both in terms of accessions and throughout the ranks. In light of these goals, the Marine Corps asked CNA to analyze the extent and causes of racial-ethnic and gender differences in success throughout the careers of officers.

COP 4500001100/Final Unclassified CPR

*Perspectives on Minority Officer Success Rates in the Marine Corps* (U) June 1994

JH North, DJ Cymrot, KD Smith, NB Carey

36pp, CNA, AQS, Repository

(U) Recent controversy over lower rates of minority success in Officer Candidate School (OCS), The Basic School (TBS), and early promotions highlights the need to learn the underlying issues, problems, and mechanisms. In 1992, the Marine Corps began to examine the relatively poor outcomes of minority officers early in their careers. It had observed, for example, that a larger proportion of minorities than whites failed to complete the initial pre-commissioning course at OCS. Efforts to understand this gap continue. The Marines convened a Quality Management Board (QMB) at Quantico to investigate the issue. The QMB commissioned CNA to conduct analyses to determine measurable factors that might explain outcome differences. Although the differential outcomes were reduced, a gap continued to exist even among groups of otherwise equally well qualified individuals. While the Marine Corps has taken positive actions, which seem to be paying off, USMC and CNA efforts continue to understand the gaps. On December 17, 1993, CNA held a conference to probe this topic from many different perspectives.

CRM 2793008110/Rev Unclassified

*Officer Accession Characteristics and Success at Officer Candidate School, Commissioning, and the Basic School*

(U) December 1993

JH North, KD Smith

76pp. CNA, AQS, Repository

(U) Each year, the Marine Corps screens about 2,000 officer candidates through its Officer Candidate School (OCS). More than half do not become commissioned officers; either they fail to complete OCS, or they subsequently fail to accept a commission. The attrition is worrisome. It is expensive both to recruit and to screen officer candidates. OCS attrition has been especially high among female and minority candidates. The differential in attrition continues at the next phase of officer training, the Basic School (TBS). Although about 95 percent of the students graduate from TBS, the average class rank of minorities and women is lower than that of white males. In this paper, we analyze the completion of OC, survival to commissioning, and class rank at TBS. This work has three objectives: (1) to estimate whether the differential in performance results from discrimination toward minorities in the Marine officer corps or from other factors or characteristics; (2) to help Marine Corps officer recruiters identify the potential officer candidates with the best of being commissioned and having a successful career; and (3) to identify potential efficiencies in the mix of OCS programs.

CRM 2793011000/Final Unclassified

*Officer Accession Characteristics and Promotions to Captain and Major* (U) November 1993

JH North, KD Smith

57pp, CNA, AQS, Repository, Paper, AD-B177151, Limited External

(U) The Marine Corps asked CNA to examine the causes of, and to identify possible solutions for, the difference in performance between white and minority officers early in their careers. We looked at four measures of success: completion of Officer Candidate School (OCS); commissioning; class rank at The Basic School (TBS); and on-time promotion to captain and major. Our primary goal was to isolate the differences by race/ethnicity for each measure by controlling for other differences. In the process, we learn what characteristics are associated with success, and this knowledge may help officer selection and identify officer candidates with the greatest likelihood of succeeding in the Marine Corps. A separate document reports on our analysis of the first three measures. This research memorandum covers our analysis of promotion. We also devised a method of allocating officer recruiting goals and resources to take advantage of the geographical distribution of qualified minorities.

CRM 2793008150/SUM Unclassified

*Why Are Minorities Less Successful in the Marine Officer Corps?* (U) October 1993

JH North, KD Smith

4pp, CNA, AQS, Repository, PC Disk, DTIC: AD-B186457

CRM 2792020200/Final Unclassified CPR

*Managing the Enlisted Marine Corps in the 1990s Study: Final Report* (U) February 1993

AO Quester, JH North

22pp, CNA, AQS, Repository, Paper, DTIC: AD-B173842

(U) This research memorandum completes the Managing the Enlisted Marine Corps in the 1990s Study. It summarizes study analyses, referring the reader to more detailed papers if more information is required.

CRM 2792021300/Final Unclassified

*Transitions in Enlisted Marine Corps Endstrength: A Disaggregated Look* (U) June 1993

JH North

114pp, CNA, AQS, Repository, Paper, DTIC: AD-B177331

(U) In this research memorandum, we discuss transition models for 36 Marine Corps occupational fields. Planners can use these models to evaluate the effects of different strategies on occupational fields' year-of-service distribution, the number of new Marines entering a field, and the number of Marines reaching their first-term end-of-active service.

CRM 2791016000/Final Unclassified CPR

*Time in Grade: A Historical Summary for Enlisted Marine Corps' Promotions from FY 1979 through FY 1990* (U) December 1991

GW Steadman, AO Quester

33pp, CNA, OPS, Repository

(U) This research memorandum documents the slowdown in enlisted Marine promotions in the last decade. It describes the time in grade at promotion for all enlisted Marines promoted from FY 1979 through FY 1990.

CRM 2786009100/Final Unclassified

*Objectivity of Fitness Reports for Enlisted Marines* (U) September 1986

CA Palomba, MD Tierney, ME Ernst, J Hughes

122pp, CNA, MCG, Repository, Limited External

(U) Every enlisted Marine with a rank of sergeant or above receives two or more fitness reports each year. These reports comprise the official assessment of the Marine's performance and exert a strong influence on the Marine's likelihood of future promotions. By taking performance, as reflected in fitness reports, into account in the promotion process, the Marine Corps attempts to ensure leadership by those most qualified to lead. Given the importance attached to fitness reports, it is important that they be objective measures of performance. This analysis examines the objectivity of these reports.

**General DOD/Other Services (with potential interest to the Marine Corps)**

CAB 4798008700/Final Unclassified

*Support to USCG Financial Management and Procurement* (U) August 1998

RM Berg, RW Venci

45pp, CNA, IOS, Repository

(U) This research and analysis effort reviewed the changing requirements affecting Financial Management and Procurement career field in support of USCG missions and operations. It also began to develop preliminary plans and strategies to meet those changing requirements for 30-coded officers within the career field. The analysis also developed a preliminary Human Resource Plan for 30-coded officers and outlined a plan for additional analysis of the career field in response to the changing requirements.

CRM 2794009800/Final Unclassified

*A Workforce Forecasting Model and Applications to the DOD Financial-Management Community* (U) February 1994

WH Sims

193pp, CNA, FPD, Repository

(U) In this research memorandum, we describe a simple workforce projection model that forecasts expected numbers of personnel in individual occupations and groups for six years into the future. Such a forecasting capability may have broad applicability in workforce planning throughout the Department of Defense (DoD). The "top-down" model used takes the Future Years Defense Program (FYDP) manpower-ceiling numbers as the major external influence driving the workforce. We model the responses of components of the workforce individually in terms of a long-term trend and the historical response pattern of each component to changes in the agency FYDP manpower ceilings.

CRM 2793010400/Final Unclassified

*Upgrades to the Community Simulation Model for Surface Warfare Officers (COSMOS)* (U) October 1993

RR Lutz, DM Rodney

37pp, CNA, AQS, Repository

(U) Officer community managers need analysis tools to project officer inventories for specific personnel policies. The Community Simulation Model for Surface Warfare Officers (COSMOS) is a discrete entity simulation that Surface Warfare Officer (SWO) community managers may use for policy analysis. CNA created COSMOS during a study for the Chief of Naval Personnel. COSMOS allows the user to: change billet parameters; set continuation rates for all SWOs; determine promotion policies and zone sizes; determine screening policies and zone sizes; and set maximum and minimum levels for accessions. Simulation models require a great deal of testing. Such models are rarely, if ever, perfect at the first attempt. The more a model is used, the more insights are likely to be obtained regarding desirable model improvements. We found this to be the case with COSMOS: after initial use of the model, the SWO community manager suggested areas for improvements. This research memorandum describes the changes we made to the first version of COSMOS. The first section explains the need for improvements; the next two sections give functional explanations of the major upgrades and examples of the effects of the changes; and the last two sections discuss other minor improvements we made and the potential for future ones.

CRM 2788021000/Final Unclassified

*A Cost-Minimization Model of Enlisted Inventory Requirements* (U) February 1989

ML Cropper

50pp, CNA, NWO, Repository

(U) This paper describes a model that minimizes the cost of meeting enlisted inventory requirements, by paygrade, at the all-Navy level. What distinguishes it from previous models is that promotion probabilities, as well as military pay, are treated as decision variables. To illustrate its usefulness, the model is applied to a problem that the Navy may confront in the 1990s: having too many enlisted personnel in senior paygrades (E-7, E-8, and E-9) relative to personnel in paygrades E-4 through E-6. The model is used to illustrate how to achieve desired levels of E-7s to E-9s by altering promotion rates and using minimal changes in military pay. These results are compared with those designed to achieve desired E-7 to E-9 levels with pay reductions alone.

## Personnel Incentives and Compensation

### Marine Corps

CRM 2792012100/Final Unclassified

*A Method for Estimating Pay for First-Term Marines* (U) December 1992

M Bowes, CM Hiatt

66pp, CNA, AQS, Repository

(U) A primary goal of CNA's Job Performance Measurement project is to estimate the first-term performance and costs of accession cohorts of varying quality. The largest component of costs is pay. This research memorandum shows how to estimate the pay of a cohort over the first term. Comparisons are made across quality groups of first-term pay per accession, per first-term completer, and per reenlistee. The estimates presented are for the infantry, but the method is applicable to any occupational field.

CRM 2785002500/Final Unclassified CPR

*Determinants of Dependency Rates for Marine Corps Enlisted Personnel* (U) May 1985

PF Kostiuik

43pp, CNA, MCG, Repository

(U) This paper analyzes the causes of the rise in the dependency rate for Marine Corps enlisted personnel since 1980. The effect of economic and demographic factors are examined statistically, and forecasts through 1988 are provided.

### General DOD/Other Services (with potential interest to the Marine Corps)

CAB D0003662.A1/Final Unclassified

*Sea Tours and Sea Pay: Patterns in Sailors' Completion and Extension of Sea Duty* (U) April 2001

H Golding, D Gregory

18pp, CNA, RAD, WET, Repository

(U) Sea manning shortfalls have plagued the Navy over the latter part of the 1990s-with E4-E9 sea manning dropping below 90 percent for much of that time. The Navy considered two general solutions: ordering sailors to sea for longer or offering incentives for sailors to volunteer for additional sea duty. Although the assignment to sea duty is involuntary, the length sailors actually serve reflects both their sea duty obligation and their willingness to serve at sea. As we will document here, many sailors do not complete their sea tours, so lengthening sea tours may not be an effective way to improve manning. A recent CNA study used survey data to predict how sailors would respond if the Navy were to restructure sea pay, which is the Navy's primary distribution tool. In this annotated briefing, we look at historical data on the average time sailors spend at sea and relate them to changes in sea pay. Survey and anecdotal evidence exist, but little direct evidence links sea pay and time spent at sea. These data provide additional empirical evidence on sailors' response to sea duty incentives and the groundwork for a more detailed study in the future. In addition, as the Navy reforms sea pay, it will need to monitor the system and change sea pay rates when necessary. The measures we present here may provide a basis for evaluating the effectiveness of the reform.

CRM D0003228.A2/Final Unclassified

*An Analysis of Navy Workers' Compensation Costs* (U) March 2001

M Bowes, J Mintz

49pp, CNA, RAD, EAS, Repository

(U) The Federal Employees' Compensation Act (FECA) provides compensation to federal civilian employees who sustain disability due to work-related injury or disease. Each year, the Department of Navy (DoN) pays about \$240 million in workers' compensation and related medical benefits under the FECA program. An executive steering group was formed to create a business plan to help DoN commands reduce compensation costs. As part of the effort to implement the management plan, the Office of the Assistant Secretary of the Navy (Installations and Environments) (OASN(I&E)) asked the Center for Naval Analyses (CNA) to examine the Navy's workers' compensation program and costs. Specifically we examined two issues: 1) what are the primary factors driving trends in Navy workers' compensation costs-injury rates or case management? and 2) are there organizational changes or initiatives the Navy could implement to bring down workers' compensation costs?

CRM D0002907.A2/Final Unclassified

*Standard of Living of Enlisted Personnel* (U) March 2001

ML Hansen, TA Husted

37pp, CNA, RAD, WET, Repository

(U) The level and composition of military pay is crucial to the success of the all-volunteer force (AVF). Most analyses of the "adequacy" of military compensation focus on comparability with earnings offered in civilian labor markets, but an effective compensation system needs to address other goals as well. An important goal is that military pay be sufficient to meet the basic needs of all personnel. This research memorandum focuses on the standard of living that the military compensation system provides its enlisted personnel and their families. The Center for Naval Analyses (CNA) reviewed the common methods, both objective and subjective, used to measure standard of living in the literature. We then used these different concepts to evaluate the standard of living of enlisted personnel. Our results suggest that relatively few enlisted personnel have incomes below the poverty lines.

CAB 4798008800/Final Unclassified CPR

*Comparisons of Enlisted and Civilian Pay* (U) August 1998

LC Cavalluzzo, JA Arkes

35pp, CNA, SPM, Repository

(U) The Personnel Readiness Division of the Joint Chiefs of Staff (J1) asked CNA to examine the earnings of enlisted personnel and to compare them with the earnings of similar people in the civilian labor market. We used multiple regressions to estimate civilian earnings of non-college-graduates and used these models to predict the earnings potential of enlisted military personnel. We found that earnings in the civilian and military sectors are similar and that both fell, when adjusted for inflation, between 1992 and 1996 (the year for which the most recent civilian data were available).

CAB 4798001000/Final Unclassified

*Why Is It So Hard to Balance the MPN Account* (U) March 1998

CS Moore, LC Barfield, D Gregory

36pp, CNA, SPM, Repository

(U) The Deputy Chief of Naval Personnel (N1) asked CNA to analyze the programming rates that the Navy uses to plan its Military Personnel, Navy (MPN) budget. In recent years, officer and enlisted MPN rates have been understated. That is, rates used to plan the budget have been lower than those executed during the fiscal year and the Navy must seek additional MPN funding to support its personnel through the end of each fiscal year. This briefing provides an overview of the MPN account and uses the example of FY97 to illustrate execution problems and actions the Navy has taken to balance the account. It also shows the extent to which actual MPN rates exceed planned rates in FY90 through FY97, and discusses possible explanations for the understatement. The study found that MPN spending has exceeded the planned amount by an average of 1% since FY90. It also found that the aging of the force has contributed to understated MPN rates and that improved models, like the one developed for this study, can provide better forecasts.

CAB 4797006300/Final Unclassified

*Sea Pay Premium for Navy Enlisted Personnel* (U) July 1997

HS Griffis, HLW Golding

40pp, CNA, SPM, Repository

(U) The deputy Chief of Naval Personnel asked CNA to analyze ways to transform the size and shape of the enlisted force to better meet the Navy's future requirements at an affordable cost. In response, CNA began its Future Force Formulation project, which has led to two main areas of analysis: changing the pattern of enlisted sea/shore rotation, and aging the enlisted force. In this annotated briefing, we analyze how a sea pay premium could be used in response to worsening enlisted sea/shore rotation. We frame this analysis in the context of a notional amount of outsourcing and its effect on rotation. We assess the cost-effectiveness of alternate sea pay premiums when coupled with outsourcing savings and then analyze the sensitivity of our results. These results can easily be extrapolated to address sea/shore rotation issues arising from other causes.



CAB 4796001200/Final Unclassified CPR

*Current Housing Allowance Methodology: Anomalies and Alternatives* (U) January 1996

JA Wilson, JL Gasch, AO Quester

52pp, CNA, SPM, Repository

(U) This analysis begins with a review of the current expenditure-based system. The system uses member survey information on housing expenditures to set the allowance rates. First, we will demonstrate how the current system should work in theory. Second, we will explore some of the problems in the current system either from its theoretical underpinnings or its method of execution. Third, we argue for a price-based alternative to the expenditure-based system. A price-based alternative uses rental prices for units of comparable size and quality to set the housing allowances for the different housing areas.

CRM 2792011400/Final Unclassified

*The Military Pay System: How Does It Work* (U) March 1993

JS McMahon

31pp, CNA, AQS, Repository

(U) The military pay system comprises many different pay elements that have developed over time. The Navy asked CNA to evaluate how the system works and whether it is flexible and efficient. We conclude that the system is similar to a civilian internal labor market. It is flexible and responsive to some external labor market pressures, but it is also unnecessarily complex and confusing, and contains some pay practices that should be phased out.

CRM 2792008300/Final Unclassified

*Pay Distributions for Enlisted Communities* (U) December 1992

JS McMahon

46pp, CNA, AQS, Repository

(U) This research memorandum examines pay distributions for 24 enlisted communities for 1989. It details total military pecuniary compensation by paygrade, with mean, median, minimum, maximum, and 10th, 30th, 70th, and 90th percentile breakdowns of the pay distributions. It also shows the inventory, age, and length of service for each paygrade. Although comparisons with civilian alternative income are difficult to derive, this memorandum provides some approximations of civilian income opportunities for full-year, full-time males.

CRM 2792009600/Final Unclassified

*Officer Communities Pay Distributions* (U) October 1992

JS McMahon

57pp, CNA, OPS, Repository

(U) This research memorandum examines pay distributions for 19 officer communities for FY 1989. We detail total military pecuniary pay, by paygrade, with mean, median, minimum, and maximum, as well as 10th, 25th, 75th, and 90th percentile breakdowns of the pay distributions. We also show the inventory, age, and length of service for each paygrade. Although civilian alternative income comparisons are difficult to derive, we provide some approximations of alternative civilian income opportunities for full-year, full-time males.

CRM 2784000600/Final Unclassified

*Civilian Earnings Opportunities of Naval Officers* (U) July 1985

ML Cropper, MS Goldberg, DJ Lindner

14pp, Repository

(U) The usefulness of Social Security data for estimating the civilian earnings opportunities of Navy officers was investigated. Several serious difficulties were encountered. First, the Social Security Administration reports earnings each year only up to the maximum amount subject to Social Security tax. The majority of separated officers earn more than this amount, so that only a lower bound to their earnings is available. Second, separated officers were not tracked for a long enough period of time to permit reliable estimation of the effect of civilian experience on their earnings. Therefore, precise estimation of the civilian earnings of separated Navy officers will have to be based on data sources other than the Social Security Administration.

## Performance/Job Proficiency

### Marine Corps

PP 5500053600/Final Unclassified CPR

*What Are the Practical Implications of Differential Validity?* (U) May 1995

NB Carey, PW Mayberry, CM Hiatt

26pp, CNA, SPM, Repository

(U) Psychologists have always been interested in the extent to which general intelligence and specific aptitudes or information contribute to job performance. Results show that for predicting mechanical performance, operational measures of general intelligence should include technical testes, and that hands-on measures result in different outcomes compared to traditional surrogate measures of job performance.

CRM 2792020700/Final Unclassified CPR

*Surrogates for Mechanical Maintenance Job Performance* (U) March 1993

VKT Tang, NB Carey, CM Hiatt

101pp, CNA, AQS, Repository

(U) In times of budgetary constraint, the Marine Corps must assess its need for high aptitude enlisted recruits. Ideally, hands-on performance tests would provide the benchmark measure of job performance against which the Marine Corps could assess its enlistment aptitude standards and the proficiency of its personnel. However, hands-on performance tests are too expensive to use for ongoing monitoring of aptitude standards and evaluation of training needs. Surrogate measures, such as job knowledge test, might provide performance benchmarks at a fraction of the cost of hands-on tests. This paper assesses the usefulness of several surrogate job performance measures for evaluating enlistment aptitude standard and determining USMC training needs.

CRM 2792019200/Final Unclassified CPR

*Relationship Between ASVAB and Mechanical Maintenance Job Performance* (U) March 1993

PW Mayberry, NB Carey

68pp, CNA, AQS, Repository

(U) The Marine Corps Job Performance Measurement (JPM) project was a long term research effort to develop objective measures of job performance and to relate these measures to the aptitude test used for military selection. The second phase of the project focused on mechanical maintenance specialties: automotive and helicopter mechanics. This research memorandum documents the ability of scores from the Armed Services Vocational Aptitude Battery (ASVAB) to predict several measures of mechanical maintenance performance: hands-on performance tests, job knowledge tests, initial skill training course grades, and supervisor ratings. We examined tradeoffs between aptitude and job experience in predicting job performance. We also derived aptitude standards for these mechanical maintenance specialties based on the hands-on performance criterion. The Marine Corps JPM project succeeded in developing reliable, objective, and representative measures of mechanical maintenance job performance. The results from the project provide the Marine Corps with convincing empirical evidence that demonstrates the strong link between performance on the ASVAB and future performance in selected mechanical maintenance jobs.

CRM 2792007100/Final Unclassified CPR

*Sensitivity and Fairness of the Marine Corps Mechanical Maintenance Composite* (U) June 1992

DR Divgi, PW Mayberry, NB Carey

16pp, CNA, OPS, Repository

(U) A score used for selection or classification should predict the performance of different population subgroups equally well. This research memorandum analyzes the prediction of hands-on performance in the automotive mechanic occupational specialty using the Marine Corps' Mechanical Maintenance composite.

CRM 2791024200/Final Unclassified CPR

*Development and Scoring of Hands-on Performance Tests for Mechanical Maintenance Specialties* (U) March 1992

NB Carey, PW Mayberry

50pp, CNA, OPS, Repository



(U) This memorandum reports the procedures used for the development and scoring of hands-on performance tests for the mechanical maintenance phase of the Job Performance Measurement project.

CRM 2791024600/Final Unclassified CPR

*Reliability of Mechanical Maintenance Performance Measures* (U) February 1992

PW Mayberry, WH Wright

51pp, CNA, OPS, Repository

(U) A fundamental requirement in the development and administration of performance measures is that such assessments should result in reliable scores that accurately indicate a person's level of proficiency. This research memorandum examines the reliability of two performance measures of mechanical maintenance developed for the Marine Corps Job Performance Measurement project: hands-on performance tests and job knowledge tests. Multiple estimates of reliability were computed, and the consistency of test administrators in scoring hands-on performance was specifically examined

CRM 2791022100/Final Unclassified CPR

*Data Quality for the Helicopter Maintenance Phase of the Marine Corps Job Performance Measurement Project*

(U) January 1992

NB Carey, CM Hiatt

78pp, CNA, OPS, Repository

(U) All large-scale data collection efforts must contend with the issue of data quality. This research memorandum examines the quality of data collected for the helicopter maintenance portion of the Marine Corps Job Performance Measurement project and describes measures taken to minimize the effect of questionable or missing cases.

CRM 2791016100/Final Unclassified CPR

*An Analysis of CAT-ASVAB Scores in the Marine Corps JPM Data* (U) September 1991

DR Divgi, PW Mayberry

19pp, CNA, OPS, Repository

(U) The Defense Department developed a Computerized Adaptive Testing (CAT) version of the Armed Services Vocational Aptitude Battery (ASVAB). During the Mechanical Maintenance phase of the Marine Corps Job Performance Measurement (JPM) project, CAT-ASVAB was administered to over 1,400 Marines in Automotive Repair and Helicopter Repair occupations. The scores of these Marines were analyzed to assess the reliability of CAT-ASVAB, the potential effects of test item compromise, and how the use of computers has affected the nature of speed tests. This research memorandum presents the results of the analysis.

CRM 2791012000/Final Unclassified CPR

*Data Quality for Automotive Maintenance Phase of the Marine Corps Job Performance Measurement (JPM)*

*Project* (U) August 1991

NB Carey, CM Hiatt

46pp, CNA, OPS, Repository

(U) All large-scale data collection efforts must contend with the issue of data quality. This research memorandum examines the quality of data collected for the automotive maintenance portion of the Marine Corps Job Performance Measurement project, and describes measures taken to minimize the effect of questionable or missing cases. Particular attention is focused on data inconsistencies and problems associated with operational fielding of the Computer Adaptive Test-Armed Services Vocational Aptitude Battery and the Enhanced Computer Administered Test.

CRM 2791009900/Final Unclassified CPR

*Analysis and Prediction of Infantry Unit Leaders' Performance* (U) June 1991

PW Mayberry

49pp, CNA, OPS, Repository

(U) This research memorandum covers a variety of issues related to the performance of enlisted infantry unit leaders and the ability of the Armed Services Vocational Aptitude Battery (ASVAB) to predict that performance. Performance strengths and weaknesses were identified for a representative sample of almost 400 unit leaders who were tested with hands-on performance tests and job knowledge tests. The tasks were also analyzed for the perishability of the skills involved if not performed on a regular basis. Finally, these measures of unit leader performance were related to ASVAB. A strong relationship was found between an individual's ASVAB scores and

his later performance as an infantry unit leader. Such findings have strong implications for the quality of individuals the Marine Corps should recruit to be able to staff its future leadership positions with qualified personnel.

CRM 2790020100/Final Unclassified CPR

*A Comparison of Hands-On and Job Knowledge Tests: Implications for Better Test Development* (U) February 1991

NB Carey

89pp, CNA, OPS, Repository

(U) Hands-on performance tests are the benchmark against which other measures of proficiency should be compared. However, hands-on performance tests are expensive, time consuming, and sometimes dangerous to personnel or equipment. This paper analyzes the relationship between hands-on performance tests and job-knowledge tests. The study extends previous studies to indicate the conditions under which job-knowledge tests should be used as surrogates and to provide guidance for developing better job-knowledge tests.

CRM 2790018200/Final Unclassified CPR

*Validation of ASVAB Against Infantry Job Performance* (U) December 1990

PW Mayberry

57pp, CNA, FSA, Repository

(U) This research memorandum examines the validity of the Armed Services Vocational Aptitude Battery (ASVAB) against several measures of infantry performance collected as part of Job Performance Measurement project. ASVAB was highly related to hands-on performance of critical infantry tasks, written infantry job knowledge tests, and grades in initial infantry training courses. The validity of ASVAB was also found to extend into the second term of service by being able to predict the performance of infantry unit leaders.

CRM 2790005500/Final Unclassified CPR

*Alternative Measures of Rifle Skills* (U) September 1990

NB Carey

53pp, CNA, FSA, Repository

(U) This paper addresses issues related to the use of alternative and surrogate tests of the skills associated with rifle firing.

PP 5500049200/Final Unclassified CPR

*Evaluating Minimum Aptitude Standards for the Infantry Occupational Field* (U) August 1990

PW Mayberry

15pp, CNA, FSA, Repository

(U) The purpose of this paper is to present a rationale for evaluating minimum qualifying standards that incorporate policy guidance and directives together with data from the Job Performance Measurement (JPM) project. First, policy guidance and directives are discussed and defined more precisely for use in quantitative analyses. The policy statements are then applied to results from the JPM project to compute a minimum qualifying aptitude score for the infantry occupational field.

CRM 2790011000/Final Unclassified CPR

*Incremental Validity of New Tests in Prediction of Infantry Performance* (U) July 1990

PW Mayberry, CM Hiatt

73pp, CNA, FSA, Repository

(U) The Armed Services Vocational Aptitude Battery (ASVAB) is highly oriented to math and verbal content areas. New predictor tests that are unique relative to the current ASVAB subtests may have potential for improving predictive validity. The purpose of this research memorandum is to investigate the incremental validity of several new tests that were administered as part of the Marine Corps Job Performance Measurement project for the infantry occupational field.

CRM 2790004700/Final Unclassified CPR

*An Assessment of Surrogates for Hands-On Tests: Selection Standards and Training Needs* (U) July 1990

NB Carey

44pp, CNA, FSA, Repository

(U) A surrogate measure is an expedient indicator of job proficiency that is reliable and valid and that yields results similar to a Hands On Performance Test (HOPT). HOPTs are the benchmark by which surrogates should be

compared but HOPTs are too expensive, dangerous, or time intensive to use for most purposes. This paper uses Job Performance Measurement (JPM) data to analyze the usefulness of six surrogates (proficiency marks, training grade point average, conduct marks, job knowledge tests, video firing tasks, and supervisor ratings) for infantry tests. The paper addresses how useful each proxy would be for setting infantry enlistment standards and assessing Marine Corps training needs.

CRM 2789021500/Final Unclassified CPR

*The Role of Aptitude Factors in Predicting Hands-on Job Performance* (U) March 1990

DR Divgi, PW Mayberry

20pp, CNA, FSA, Repository

(U) It has been claimed that, except in clerical jobs, all the predictive power of the Armed Services Vocational Aptitude Battery arises from its measurement of general cognitive ability. This conclusion is based on analyses of training grades. The present paper shows that, when the criterion is hands-on performance, aptitude factors make statistically and practically significant additions to the variance explained by general cognitive ability.

PP 5500046500/Final Unclassified CPR

*Validity Results for the Marine Corps Job Performance Measurement Project* (U) November 1989

PW Mayberry

7pp, Repository

(U) This paper examines three aspects of the Marine Corps validation research effort that may have implications for Marine Corps manpower issues. They are: validity of the Armed Services Vocational Aptitude Battery (ASVAB) in the prediction of job performance, differential validity of ASVAB aptitude composites in the prediction of job performance across infantry occupational specialties, and, interaction of aptitude and experience in the prediction of job performance.

CRM 2789028500/Final Unclassified

*Differential Prediction of Infantry Job Performance* (U) October 1989

PW Mayberry, CM Hiatt

59pp, CNA, NMC, Repository, Limited External

(U) A selection test should predict the future performance for all groups of applicants equally well. This research memorandum documents analyses of the prediction of infantry performance for three racial groups.

CRM 2789004500/Final Unclassified CPR

*Performance of Basic Infantry Tasks* (U) July 1989

PW Mayberry

67pp, CNA, NMC, Repository

(U) Objective empirical data reflecting a Marine's ability to perform basic infantry tasks are rare. Data from the Marine Corps Job Performance Measurement Project are used to describe the performance levels of infantrymen. Performance strengths and weaknesses are identified, and measures reflecting how recently Marines have performed infantry tasks are noted. Results of the interaction of the performance outcomes and the recency of task performance have potential implications for training in infantry tasks.

CRM 2789000900/Final Unclassified CPR

*Evaluating Minimum Aptitude Standards* (U) July 1989

MH Maier, PW Mayberry

35pp, CNA, NMC, Repository

(U) The evaluation of aptitude standards to determine qualification into military specialties must address issues concerning both the minimum qualifying score and the appropriate aptitude distribution above that minimum. This research memorandum is an initial effort that focuses on identifying the minimum qualifying aptitude score for assigning recruits to occupational specialties. Hands-on job performance tests developed for the Marine Corps infantry occupational field provide the context for the analysis. Subsequent research will address the evaluation of the necessary aptitude distributions.

CRM 2788025900/Final Unclassified CPR

*Analysis of Data Quality for the Infantry Phase of the Marine Corps Job Performance Measurement Project* (U) March 1989

PW Mayberry

40pp, CNA, NMC, Repository

(U) All large-scale data collection efforts must contend with the issue of data quality. This research memorandum examines the quality of data collected for the infantry portion of the Marine Corps Job Performance Measurement Project. Particular attention is focused on data inconsistencies and imputation of missing data.

CRM 2788010400/Final Unclassified

*Feasibility of Using MCCRES to Estimate the Effect of Mental Aptitude on Unit Performance* (U) August 1988

TE Rupinski

60pp, CNA, NMC, Repository

(U) This research memorandum examines the relationship between unit performance in the infantry and the mean aptitudes of the Marines who compose these units. The primary objective of the analysis is to determine the feasibility of using performance data from the Marine Corps Combat Readiness Evaluation System (MCCRES) to estimate the effect of mental aptitude on combat readiness at the battalion level.

CRM 2786021400/Final Unclassified CPR

*From Hands-On Measurement to Job Performance: The Issue of Generalizability* (U) October 1986

PW Mayberry

63pp, CNA, MCG, Repository

(U) The generalization from hands-on test scores to performance in a military occupation specialty can be threatened by many potential sources of error within the measurement process. Such sources of error can include scoring inconsistencies by test administrators, testing over a long period, and diverse test content. This analysis estimates the influence of these factors on the hands-on scores for three Marine Corps specialties. Estimates of test reliability are discussed in light of the effect the measurement factors on the hands-on scores. Research designs to assess specific issues of reliability are proposed for the full-scale administration of hands-on tests to the Infantry occupational field.

CRM 2786009100/Final Unclassified

*Objectivity of Fitness Reports for Enlisted Marines* (U) September 1986

CA Palomba, MD Tierney, ME Ernst, J Hughes

122pp, CNA, MCG, Repository, Limited External

(U) Every enlisted Marine with a rank of sergeant or above receives two or more fitness reports each year. These reports comprise the official assessment of the Marine's performance and exert a strong influence on the Marine's likelihood of future promotions. By taking performance, as reflected in fitness reports, into account in the promotion process, the Marine Corps attempts to ensure leadership by those most qualified to lead. Given the importance attached to fitness reports, it is important that they be objective measures of performance. This analysis examines the objectivity of these reports.

CRC 0205500000/Final Unclassified CPR

*The Translation of Supervisory Ratings into Measurements of Relative Value* (U) July 1986

LJ May

102pp, CNA, MCG, Repository

(U) The goal of this study was to develop a procedure for determining the magnitude of the performance differences between different categories of enlisted personnel. The professional judgement of Marine Corps officers is used as the basis for building a scale that translates the current performance evaluation system into a measure of an individual's relative value to the service.

PP 5500045400/Final Unclassified CPR

*Marine Corps Project to Validate the ASVAB Against Job Performance* (U) May 1987

MH Maier

16pp, CNA, MCG, Repository

(U) The Marine Corps conducted an initial validation study in 1981 to evaluate the predictive validity of the Armed Services Vocational Aptitude Battery (ASVAB) against hands-on and written job performance tests. This report reviews the initial study in light of the services' experience since 1981.

CRC 0205400000/Final Unclassified CPR

*Examining the Validity of Hands-On Tests as Measures of Job Performance* (U) May 1986

PW Mayberry

86pp, CNA, MCG, Repository

(U) Having been designated as the benchmark for assessing on-the-job performance, hands-on tests need to be examined for the quality of their measurement. This analysis evaluates the measurement validity of hands-on tests based on the results of tests developed for three Marine Corps Military Occupational Specialties (MOS): Ground Radio Repair; Automotive Mechanic; and Infantry Rifleman.

CRM 2785007900/Final Unclassified CPR

*On the Content and Measurement Validity of Hands-On Job Performance Tests* (U) August 1985

MH Maier, CM Hiatt

58pp, CNA, MCG, Repository

(U) Hands-on tests of job performance have intrinsic validity because of their high fidelity to job behavior. However, they are susceptible to poor content and measurement validity. The purpose of this analysis is to examine the content and measurement validity of prototype hands-on tests developed for three Marine Corps specialties - Ground Radio Repair, Automotive Mechanic, and Infantry Rifleman.

CNR 9400890000/Final Unclassified CPR

*An Evaluation of Using Job Performance Tests to Validate ASVAB Qualification Standards* (U) May 1984

MH Maier, CM Hiatt

191pp, CNA, MCP, Repository

(U) The feasibility of validating ASVAB enlistment standards against job performance is evaluated. Hands-on and written proficiency tests were developed for three Marine Corps skills--Ground Radio Repair, Automotive Mechanic, and Infantry Rifleman--for use as measures of job performance. In addition, grades in skill training courses were also evaluated as possible measures of job performance. The ASVAB was shown to be a valid predictor of job performance. All three measures--hands-on tests, written tests, and training grades--were generally consistent measures of performance. A preliminary set of ASVAB qualification standards for assigning recruits to these three skills was computed using the hands-on and written tests as the criterion measure. The ASVAB standards derived from this analysis are similar to the standards based on the traditional criterion measure of training-course grades. We conclude that validating ASVAB enlistment standards against job performance appears to be feasible. Although job performance tests can be used for this purpose, they are costly to develop and administer. Training grades, which are routinely available, may serve as a satisfactory and economical proxy for them in many skills.

#### **General DOD/Other Services (with potential interest to the Marine Corps)**

CAB 4793002000/Final Unclassified

*Job Performance Surrogates in Combat: An Annotated Briefing* (U) September 1993

WH Sims, CM Hiatt

14pp, CNA, AQS, Repository

CRM 2792003600/Final Unclassified CPR

*Factor Structure and Incremental Validity of the Enhanced Computer-Administered Tests* (U) July 1992

NB Carey

98pp, CNA, OPS, Repository

(U) The Armed Services Vocational Aptitude Battery (ASVAB), used to select and classify enlisted personnel, is highly correlated to math and verbal content areas. New computerized predictor tests that are sensitive to traits not measured by the current ASVAB subtests may be able to improve predictive validity. This research memorandum investigates the potential of one such group of tests, the Enhanced Computer-Administered Tests, to predict performance in the mechanical maintenance specialties.

CRM 2790021700/Final Unclassified CPR

*Robust Estimation Using Student's *t* Distribution* (U) December 1990

DR Divgi

20pp, CNA, FSA, Repository

(U) Robust estimators are useful when observations contain gross errors or are sampled from a heavy-tailed distribution. Student's *t* distributions with small degrees of freedom have heavy tails. Therefore, maximum likelihood estimation using these distributions provides simultaneous robust estimates of location and scale. In addition, the likelihood values can be used to choose among the available *t* distributions, making it unnecessary to make a subjective choice of an estimator. Monte Carlo results show these estimators to be as efficient as the bi-weight estimators of location and scale.

CRM 2790011900/Final Unclassified CPR

*Development of Overlength Forms for a New Enlistment Screening Test* (U) December 1990

DR Divgi

24pp, CNA, FSA, Repository

(U) Overlength forms, containing about 50 percent more items than needed in the final forms, have been developed for a new Enlistment Screening Test. These forms were constructed using items from discontinued forms of the DoD's test batteries. This research memorandum describes the data analyses and their results.

CRM 2789031100/Final Unclassified CPR

*Methods to Assess the Utility of Proxies* (U) August 1990

NB Carey

48pp, CNA, FSA, Repository

(U) This research memorandum reviews methods for quantifying the trade-offs between using proxy (i.e., surrogate) measures of job performance versus the established benchmark criterion of hands-on performance tests. Such analytical methods must be sensitive to the intended application of the proxy. Two applications that require precise performance information are examined for equivalence of outcomes when proxies are used as opposed to hands-on tests.

CRM 2788023600/Final Unclassified CPR

*A Maximum Likelihood Procedure for Developing a Common Metric in Item-Response Theory* (U) February 1989

DR Divgi

16pp, CNA, NMC, Repository

(U) Because the ability scale in item-response theory is arbitrary, if two item pools are calibrated in two different samples, their parameter estimates must be placed on a common metric using items administered in both calibrations. In this memorandum, a maximum-likelihood procedure for doing so is illustrated.

CRM 2787005400/Final Unclassified CPR

*Alternative Modeling Approaches for Setting Cost-Effective Qualification Standards* (U) May 1987

LJ May

44pp, CNA, MCG, Repository

(U) The Rand Corporation has developed a model that determines cost-effective enlistment standards for Military Occupational Specialties. Since this model may have an impact on enlistment policy, it is important that the modeling approach used to determine the enlistment standards be fully understood. This research memorandum describes the modeling technique used by the Rand Corporation and compares the Rand approach to alternative modeling methods in an attempt to determine the sensitivity of the model outcome to the methodology employed.

PP 5500045200/Final Unclassified CPR

*Issues in the Development of a Competency Scale: Implications for Linking Job Performance and Aptitude* (U) April 1987

PW Mayberry

21pp, CNA, MCG, Repository

(U) The selection of test content and the construction of job performance tests has not followed any specific methodology. For determining qualification standards on the Armed Services Vocational Aptitude Battery (ASVAB), a more absolute interpretation is required of the performance test scores. This report proposes that a domain-referenced approach is necessary for the linkage of job performance and aptitude in determining standards on the ASVAB. This absolute interpretation of test scores, called competency-based measurement, is based upon two critical requirements of the test construction process: detailed specification of the job requirements domain and appropriate sampling of test content from that domain.

PP 5500044600/Final Unclassified CPR

*Towards Justifying Enlistment Standards: Linking Input Characteristics to Job Performance* (U) October 1986

PW Mayberry, MH Maier

12pp, CNA, MCG, Repository

(U) The Job Performance Measurement Project has broken new ground by embarking on the large-scale development and administration of hands-on job performance tests. In the next stage, this pioneering effort can go even further in helping to rationalize the selection and classification process by evaluating the cost-effectiveness of enlistment standards. This paper outlines a process for such an evaluation.

CRM 2786020000/Final Unclassified CPR

*The Rand Cost-Performance Model for Setting Qualification Standards: Preliminary Comments* (U) September 1986

LJ May, PW Mayberry

37pp, CNA, MCG, Repository

(U) The Rand Corporation has developed a model to determine cost-effective qualification standards for military occupational specialties. Since this model may potentially have an impact on enlistment policy, it is important to fully understand its assumptions and procedures. The research memorandum examines key elements of the model, discusses the impact they have on the outcome of the model, and identifies issues that might benefit from further analysis.

CRM 2786018700/Final Unclassified CPR

*Confirming Differences in Relative-Value Proficiency Marks* (U) July 1986

PW Mayberry

30pp, CNA, MCG, Repository

(U) Knowing the magnitude of performance differences among individuals is critical in making personnel decisions in the Marine Corps. Recent research at the Center for Naval Analyses has focused on quantifying the magnitude of these performance differences. The purpose of this analysis was to cross-validate those results using hands-on measures of job performance and other published research findings.

CRM 2786000900/Final Unclassified

*The Relationship Between Flight Hours, Boarding Rates, and Landing Grades* (U) January 1986

MS Goldberg

45pp, CNA, PML, Repository

(U) This research memorandum uses data on 82 pilots during an 8-month deployment of the USS Carl Vinson to relate flight hours to boarding rates and landing grades. Cumulative career flight hours are found to have a consistent positive effect on both boarding rates and landing grades. Career flight hours are also found to have a negative effect on the dispersion of boarding rates. In contrast to career flight hours, current-month flight hours do not exhibit any relationship to boarding rates or landing grades. It appears that experienced career pilots are more proficient than inexperienced pilots, regardless of their recent flying history.

CRM 2785004000/Final Unclassified CPR

*Effects of Truncating a Reference Population on Correction of Validity Coefficients for Range Restriction* (U) June 1985

MH Maier

25pp, CNA, MCG, Repository

(U) Correlation coefficients based on samples from occupational specialties that differ in qualification standards cannot be compared. The sample coefficients need to be put on the same metric by correcting them to a common reference population. The purpose of this analysis is to evaluate the effects of truncating the reference population on the correlation coefficients and on the inter-correlation of performance measures. Population wide estimates were computed in the full population and in the truncated population with the bottom 10 percent deleted.



## Testing

### Marine Corps

CAB D0003683.A1/Final Unclassified CPR

*Marine Corps Selection and Classification* (U) April 2001

W Sims, CM Hiatt

49pp, CNA, RAD, WET, Repository, Unlimited Distribution

(U) This report documents a series of briefings on Marine Corps personnel selection and classification issues presented at a workshop held March 28 and 29 2001. Separate briefings (combined in this report) covered the following issues: review of validation systems; validation of ASVAB for selection and classification of officers and enlisted personnel; validation of the experimental Assembling Objects subtest; and performance criteria.

CAB 4797001800/Final Unclassified

*Revalidation of the Aviation Selection Test Battery (ASTB)* (U) July 1997

CM Hiatt, PW Mayberry, WH Sims

115pp, CNA, SPM, Repository

(U) The Aviation Selection Test Battery (ASTB) is used to determine whether a candidate is qualified for naval flight training. It is designed to predict the performance of students in the initial phases of flight training. In 1992, ASTB was revised for the first time in twenty years. The Marine Corps asked CNA to determine whether the current ASTB is a valid and unbiased predictor of performance during aviation training and whether it has adverse impact on selection. To answer these questions, we analyzed data on the performance and attrition of students in the first two phases of flight training, the Aviation Preflight Indoctrination (API) and Pilot Primary. This document reports on our findings in this study.

CRM 2796008400/Final Unclassified

*Validation of Armed Services Vocational Aptitude Battery Against Training Success* (U) September 1996

PW Mayberry, CM Hiatt

215pp, CNA, SPM, Repository

(U) The Armed Services Vocational Aptitude Battery (ASVAB) is administered to potential military recruits to assess their likelihood for success in formal training courses. Services use ASVAB scores to determine eligibility for enlistment and to classify people with respect to the type of military jobs that best match their aptitudes. To accomplish these ends, the ASVAB must be able to meaningfully predict a person's level of training performance. The purpose of this study is to examine the relationship between ASVAB and training

CAB 4796006700/Final Unclassified

*Validation of the ASVAB for Officer Accessions* (U) June 1996

WH Sims, CM Hiatt

38pp, CNA, SPM, Repository, Limited External

(U) The objective of this study is to determine an appropriate Armed Services Vocational Aptitude Battery (ASVAB) composite for Marine Corps officer accessions. The composite will be valid across ethnic and gender boundaries. We analyzed data on aptitude test scores and performance in The Basic School (TBS) for officers entering TBS from 1980 through 1995. Although the primary performance criterion was the overall TBS score, we also examined the academic, leadership, and military skills components of the overall score. We considered the current ASVAB officer selection composite, EL, as well as the existing Armed Forces Qualification Test (AFQT) score expressed in standard score form. We also developed several alternatives that are optimized to predict various components of TBS performance.

CAB 4796002000/Final Unclassified

*Appropriateness of New CAT-ASVAB Forms* (U) March 1996

WH Sims

18pp, CNA, SPM, Repository

(U) The Armed Services Vocational Aptitude Battery (ASVAB) is a paper-and-pencil test used by all services to measure the mental aptitudes of prospective enlistees. In addition, the Marine Corps uses the test as an alternative



qualification standard for officers. In 1994, a computerized adaptive version, CAT-ASVAB, was introduced in six testing sites and is expected to be implemented throughout the nation by 1997. Current forms of the ASVAB are replaced every four or five years in an effort to minimize test compromise. This report addresses concerns about the appropriateness of some proposed new forms.

CRM 2795021100/Final Unclassified

*Examining the Feasibility of Biographical and Psychological Assessments for Selection of Marine Corps Enlisted Personnel* (U) March 1996

PW Mayberry

42pp, CNA, SPM, Repository

(U) Much of the success of the military selection process depends on the proper specification of what defines military performance and the determination of indicators that can accurately predict these measures. The Marine Corps has asked CNA to examine the feasibility of including new information from biographical or psychological measures to improve the enlisted selection process. Such information must be examined within the context of the full selection process to determine its incremental value. This review is part of a larger CNA study examining the relationship between scores on the Armed Services Vocational Aptitude Battery and success in entry-level training. In this research memorandum, we present defensible criteria for addressing the feasibility of new predictor tests, with particular emphasis on biographical and psychological measures.

CAB 4795002000/Final Unclassified

*Equivalent Scores on SAT and ASVAB/EL* (U) November 1995

CM Hiatt, WH Sims

24pp, CNA, SPM, Repository

(U) This briefing describes a new determination of equivalent scores on the Scholastic Aptitude Test (SAT) and the Electronics (EL) composite. The EL composite is a part of the armed Services Vocational Aptitude Battery (ASVAB). The current practice of considering SAT of 1000 and EL of 120 as equivalent qualification scores is inconsistent. It allows officers of significantly lower academic potential to qualify on EL. These briefing slides and accompanying text summarize our findings and describe how we came about our conclusions.

CRM 2793018800/Final Unclassified

*Impact on USMC Officer Selection of Applicants' Age and Education at Time of SAT and ASVAB* (U) April 1994

WW Davis, CM Hiatt

86pp, CNA, AQS, Repository

(U) This study answered the following two questions: (1) Are U.S. Marine Corps (USMC) officer commissioning standards for the Scholastic Aptitude Test and the Armed Services Vocational Aptitude Battery equivalent? and (2) Should these standards vary with age or education level? Using the best available data, our answers are "yes" and "not yet." We based these answers on the scores of potential applicants who might not be representative of the population of interest. We sketch how the USMC could obtain data that would lead to more definitive answers.

CRM 2793008700/Final Unclassified

*Air Controller Test Validation Study: Final Report* (U) July 1993

WW Davis, PH Stoloff, DS Esser, CM Hiatt

99pp, CNA, AQS, Repository

(U) Attrition in the Air Traffic Control (ATC) rating occurs both during A-school and during fleet assignments. The problem seems to stem from lack of aptitude for ATC among selected students. To attack this problem, the Chief of Naval Technical Training (CNTECHTRA) tasked the Center for Naval Analyses (CNA) to develop an aptitude test designed to measure specific skills required for air traffic control. In response, CNA adapted its Air Controller Aptitude Battery and in this study has validated the test for use by both the Navy and the Marine Corps.

CRM 2792021200/Final Unclassified CPR

*Validity of the Marine Corps Electronics Composite for Predicting Success in Electronics Training School* (U) March 1993

NB Carey, CM Hiatt

79pp, CNA, AQS, Repository

(U) The armed services use the Armed Services Vocational Aptitude Battery (ASVAB) to select and classify enlisted personnel. The Marine Corps uses its Electronics (EL) composite of four ASVAB subtests to classify

recruits into electronics-related field. This memorandum investigates whether the Marine Corps' EL composite is a valid predictor of performance in electronics courses, and whether the current EL standard of 115 is supported by analysis of training grade data.

CRM 2789029000/Final Unclassified CPR

*Effect of the GT Composite Requirement on Qualification Rates (U)* March 1990

NB Carey

25pp, CNA, FSA, Repository

(U) This paper analyzes whether recent changes in the definition of the Armed Forces Qualification Test (AFQT) have reduced the supply of eligible Marine Corps applicants, and whether composites other than General Technical (GT) can increase eligibility rates appreciably.

CRM 2786019500/Final Unclassified CPR

*The Impact of the Adjusted Scaling of ASVAB Forms 11, 12, and 13 (U)* September 1986

GE Horne

30pp, CNA, MCG, Repository

(U) New scales for Armed Services Vocational Aptitude Battery (ASVAB) forms 11, 12, and 13 have been implemented. This research memorandum describes the impact of this adjusted scaling on scores for FY 1985 Marine Corps applicants. In addition, the initial and adjusted scalings for each ASVAB subtest are compared.

CRM 2786017900/Final Unclassified CPR

*Validity of the ASVAB for Predicting Performance in Marine Corps Training Courses: Gender Differences (U)*

August 1986

MH Maier, MD Curia

48pp, CNA, MCG, Repository, Limited External

(U) Females tend to have higher performance than males in clerical and food services training courses, when aptitude scores are held constant. To help account for the differences, educational level and interest in clerical-type activities are included in this analysis, along with aptitude composite scores. A recommendation is made about adjusting aptitude qualifying scores for females.

CNR 9401020000/Final Unclassified CPR

*Validity of the Armed Services Vocational Aptitude Battery Forms 8, 9, and 10 with Applications to Forms 11, 12, 13, and 14 (U)* February 1985

MH Maier, AR Truss

129pp, CNA, MCG, Repository

(U) The Armed Services Vocational Aptitude Battery (ASVAB) was validated against training grades in 34 Marine Corps occupational specialties. Four aptitude composites for assigning Marine recruits to occupational specialties were developed and evaluated. The high predictive validity of the ASVAB supports its continued use for selecting recruits and assigning them to occupational specialties. The fairness of the aptitude composites as predictors of performance was evaluated for racial/ethnic minorities and females.

#### **General DOD/Other Services (with potential interest to the Marine Corps)**

CAB D0003839.A1/Final Unclassified

*Follow-on Analysis of PAY 97 Test Scores (U)* July 2001

W Sims, CM Hiatt

70pp, CNA, RAD, WET, Repository

(U) In 1997, in a joint effort, the Department of Labor (DOL) and the Department of Defense (DOD) collected aptitude test data from the Armed Services Vocational Aptitude Battery (ASVAB) on a nationally representative sample of youth. The tests were administered as part of the National Longitudinal Survey of Youth (NLSY97). A subset of data pertaining to youth 18 to 23 years of age is referred to as the Profile of American Youth (PAY 97). In 1999 CNA conducted an initial analysis of PAY 97 test scores. We concluded that the data sample was missing a large number of persons likely to deplete both the upper and lower levels of aptitude distributions. We further concluded that the loss would bias resulting norms unless corrected. We recommended weighting the data by race, gender, age, respondent's education, and a proxy for social economic status in an effort to correct the bias. The data

were subsequently weighted by NORC. This report describes the follow-on analysis that we conducted on PAY 97 test scores. This work was funded by the Defense Manpower Data Center (DMDC).

CAB 4799006600/Final Unclassified

*Analysis of NLSY 97 Test Scores* (U) July 1999

WH Sims, CM Hiatt

53pp, CNA, IOS, Repository

(U) This briefing describes our analysis of Armed Services Vocational Aptitude Battery (ASVAB) scores from tests administered as part of the 1997 National Longitudinal Survey of Youth (NLSY). The objective of the analysis is to determine if ASVAB scores from the 1997 NLSY are biased in that score distributions are distorted by the absence of persons who declined to participate in the data collection. We found the NLSY Enlistment Testing Program (ETP) sample is missing a large number of persons likely to deplete both the upper and lower levels of aptitude distributions and the loss will bias norms unless corrected. Correction will require, at a minimum, weighting the sample on respondent's ages and education in addition to the more customary race and gender variables.

CAB 4797000300/Final Unclassified

*Competing Criteria in the Formation of Aptitude Composites* (U) March 1997

PW Mayberry

72pp, CNA, SPM, Repository

(U) The Armed Services Vocational Aptitude Battery (ASVAB) is administered to potential military recruits to assess their likelihood for success in formal training courses. The services use ASVAB scores to determine eligibility for enlistment and to classify personnel with respect to the types of military jobs that best match their aptitudes. To accomplish these ends, the ASVAB must be able to meaningfully predict a person's level of training performance. As a result of changes and consolidations in military occupational specialty (MOS) requirements, advances in training technology and techniques, and performance expectations, the Deputy Chief of Staff for Manpower and Reserve Affairs (DC/S M&RA) asked CNA to examine the current relationship between aptitude and entry-level training success. In this briefing, we will focus on the validity outcomes for all Marine Corps entry-level training courses, discuss our strategy for determining the best aptitude composites for each course, and detail our approach for evaluating the appropriateness of cut-scores for selection and classification decisions. Particular emphasis will be given to the tradeoff between changes in validity and changes in subgroup qualification rates.

CAB 4795002400/Final Unclassified

*Analytic Causes of Findings of Minority Underperformance* (U) November 1995

WH Sims, CM Hiatt

54pp, CNA, SPM, Repository

(U) Common analytical shortcomings present in many analyses will lead to finding minority underperformance even if there is none. These shortcomings include test measurement error, non-optimal predictor composites, the use of non-concurrent predictor and criterion measures, and incorrect treatment of failures and recycles. All analyses will be affected by test measurement error unless corrections are made. The other shortcomings may, or may not, be present in a particular analysis. When they are present, the effects appear to be cumulative. When performance data is properly analyzed it usually shows no bias. Racial minorities and majorities with identical true scores usually perform equally well. This briefing is divided into sections on background, hypothesis, analysis, and findings.

CAB 4795005600/Final Unclassified

*Retention or Elimination of Speeded Subtests in ASVAB* (U) May 1995

CM Hiatt, WH Sims

25pp, CNA, SPM, Repository

(U) There are two speeded subtests in the ASVAB, Numerical Operations and Coding speed. Unlike the other subtests that measure how much a person knows, the speeded subtests measure how fast a person can respond with a correct answer to a very easy question. Historically, the speeded subtests have been a source of trouble. We know that the speed of the response, and hence the score, is affected by all sorts of extraneous factors. In the past, scores have been distorted by both answer sheet and test booklet layout. Many high school students have scored unusually high on the speeded subtests, suggesting that nonstandard testing conditions may also affect the scores.

CRM 2794015100/Final Unclassified

*CNA's Role in Finding and Fixing the ASVAB Misnorming* (U) January 1995

WH Sims

33pp, CNA, FPD, Repository

(U) The purpose of this report is to summarize the Center for Naval Analyses' (CNA's) role in finding and fixing the Department of Defense (DoD) manpower quality problem known as the "ASVAB misnorming." The term "norming," as used in this report for historical consistency, denotes converting the number of correct answers on an aptitude test into scores in a standard reference population. The year 1979 was difficult for DoD manpower officials. Recruiting goals were not being met; the General Accounting Office (GAO) was investigating recruiting malpractice; and critics of the all-volunteer force were again proclaiming the concept a failure. However, there was one bright spot—at least the recruits that were being enlisted were of high quality. DoD was consistently reporting to Congress that only five percent of all recruits in AFQT category IV, the lowest acceptable ability category. Never in history had quality been so good. Unfortunately, the reports were not true.

CAB 4793002800/Final Unclassified

*Alternative Metrics and Reference Populations for AFQT and Service Composites: An Annotated Briefing* (U)

October 1993

WH Sims

17pp, CNA, AQS, Repository

(U) This briefing discusses alternative metrics and reference populations for Armed Forces Qualification Test and Service Composites. The goal is to understand how various segments of the Armed Services Vocational Aptitude Battery community use test scores and to draw implications for the type of score scale(s) that will be needed. A list of alternative metrics and score scales are provided, and then examples of how various test consumers use the scores are shown. Finally, it summarizes the uses and users of scores and explores a range of options open.

CRM 2792008000/Final Unclassified CPR

*Computing AFQT Scores From Historical Data* (U) August 1992

PW Mayberry, CM Hiatt

84pp, CNA, OPS, Repository

(U) The Armed Forces Qualification Test (AFQT) serves as an initial screen for military selection. AFQT scores must accurately reflect the quality of recruits who enter the services and must maintain the same meaning and interpretation over time. Unfortunately, several changes in the AFQT and other problems make such historical computations and score interpretations difficult. This research memorandum details these past problems and presents solutions that will allow for the proper computation of current AFQT scores from historical databases.

CRM 2791022400/Final Unclassified CPR

*Uniqueness of a Psychomotor Construct to ASVAB* (U) January 1992

PW Mayberry, DR Divgi

29pp, CNA, OPS, Repository

(U) Computerized administration of the Armed Services Vocational Aptitude Battery (ASVAB) potentially offers several benefits over the current paper-and-pencil administration. One benefit is the possible expansion of predictor tests beyond the dominant mathematical and verbal orientation of the ASVAB. This research memorandum first examines the comparability of measurement for the computerized and paper-and-pencil tests. Second, several new tests that measure psychomotor skills (hand-eye coordination and manual dexterity) are examined for their ability to expand the range of dimensions currently assessed by the ASVAB, as well as to improve the prediction of performance in mechanical maintenance jobs.

CRM 2791015400/Final Unclassified

*A Test of the Temporal Invariance of ASVAB Item Parameters* (U) November 1991

DR Divgi

18pp, CNA, OPS, Repository

(U) A basic assumption of item response theory is that parameters of test items do not vary across populations. This research memorandum describes a test of this assumption. The Armed Services Vocational Battery was administered twice, in 1980, to a sample of nationally representative youth and in 1988, to military applicants. Data from the two administrations were compared to determine the degree to which item parameters had changed over time.

CRM 2791008500/Final Unclassified CPR

*Development of ASVAB Norms for the Student Testing Program (U) June 1991*

DR Divgi

47pp, CNA, OPS, Repository

(U) The Armed Services Vocational Aptitude Battery (ASVAB) is administered in high schools and post-secondary schools as part of DoD's Student Testing Program. Norms for 11th and higher grades are based on a national sample tested in 1980 as part of the Profile of American Youth Study. Tenth grade norms use a nonrandom sample collected in 1984 by the Military Entrance Processing Command. With the introduction of Forms 18 and 19, scores will be reported on three composites and ten subtests. The objective of this research memorandum is to present norms for these scores.

CRM 2791008200/Final Unclassified CPR

*Comparison of Three Procedures for Smoothing Score Distributions (U) June 1991*

DR Divgi

20pp, CNA, OPS, Repository

(U) Distributions of test scores need to be smoothed in equating and/or norming. Popular parametric smoothing procedures are based on beta-binomial and log-linear models. A new approach has been developed using polynomials of the beta-binomial cumulative distribution function. The same approach was also applied to extend the beta-binomial family to more than four parameters. These methods were compared using cross-validation in two examinee samples who took the Armed Services Vocational Aptitude Battery. Results show that the log-linear and extended beta-binomial families fit the data about equally well.

CRM 2790012000/Final Unclassified CPR

*Construction of Final Forms for a New Enlistment Screening Test (U) December 1990*

DR Divgi

20pp, CNA, FSA, Repository

(U) Two forms, each containing 35 verbal and 30 mathematics items, have been developed for a new Enlistment Screening Test (EST) to predict Armed Forces Qualification Test (AFQT) scores of military applicants. These forms were constructed in two stages from items in discontinued versions of the Defense Department's test batteries. The first stage was to develop overlength forms from the available item pool. This research memorandum describes the second stage: constructing final forms by selecting items from the overlength forms. Item selection was based on the correlation of the item with AFQT, in a subsample of applicants with AFQT percentiles between 21 and 65. For each EST form, the AFQT score was predicted from the total score on the final EST items. The results were used to calculate expectancy tables which, for any given EST score, provide probabilities of exceeding the specified AFQT cutoffs. These probabilities are reported in tables.

CRM 2789023400/Final Unclassified CPR

*Concurrent Versus Enlistment ASVAB in Evaluation of New Tests (U) March 1990*

DR Divgi

17pp, CNA, FSA, Repository

(U) New kinds of tests are being evaluated as potential additions to the Armed Services Vocational Aptitude Battery (ASVAB). They are compared on the basis of the criterion variance they explain when added to the ASVAB. The evaluation may use scores on the ASVAB given during enlistment processing, or a new ASVAB may be administered concurrently with the new tests. This paper compares these two research designs in terms of their effect on evaluation of new tests. The analysis uses Infantry data from the Marine Corps' Job Performance Measurement project, in which concurrent as well as enlistment ASVAB scores are available. While lower increments in explained variances are obtained when the ASVAB is concurrent, the difference between the administrations is small compared to variations across criterion variables and occupational areas.

CRM 2789010300/Final Unclassified CPR

*Some Issues in the ECAT and CAT-ASVAB Projects (U) February 1990*

DR Divgi

30pp, CNA, FSA, Repository

(U) The Department of Defense is developing a computerized adaptive-testing version of the Armed Services Vocational Aptitude Battery (ASVAB). This or some other version of the ASVAB may be enhanced by the addition of new, computerized subtests. A cost/benefit analysis has estimated a benefit of \$450 million per year as the result

of such enhancement. This paper questions the operational relevance of any such estimate. The paper describes ways in which the validation study of new tests needs to be expanded. It also discusses pros and cons of adaptive testing.

CRM 2789011400/Final Unclassified CPR

*Relative Average Recruiting Yields by AFQT Category* (U) May 1989

J Hughes, WH Sims

22pp, CNA, NMC, Repository

(U) The number of recruits enlisted from a target population varies significantly by aptitude score. This memorandum calculates the ratio of recruits to population by AFQT category for the fiscal years 1980 to 1987.

CRM 2788012300/Final Unclassified CPR

*A Comparison of Linear and Equipercentile Test Equating Procedures in Large Samples* (U) December 1988

DR Divgi

15pp, CNA, NMC, Repository

(U) Scores on new forms of a test are equated to those on an old form. Two common equating procedures are linear and equipercentile. Cross-validation is used to show that, with sample sizes of 6500 and above, equipercentile equating is preferable to linear for the Armed Services Vocational Aptitude Battery.

CRM 2788017100/Final Unclassified CPR

*Two Consequences of Improving a Test Battery* (U) October 1988

DR Divgi

18pp, CNA, NMC, Repository

(U) Replacement of a paper-pencil test battery with a computerized adaptive version is likely to increase reliabilities of the subtests. This leads to an increase in the variances of composite scores, and to lower mean scores for subgroups whose average scores are already below those of the general population. These results are illustrated with a computer simulation.

CRC 0205810000/Final Unclassified CPR

*Estimating Reliabilities of CAT-ASVAB Subtests* (U) January 1988

DR Divgi

19pp, CNA, NMC, Repository

(U) An experimental computerized adaptive testing (CAT) version of the Armed Services Vocational Aptitude Battery (ASVAB) has been developed and administered, and a new version is under preparation. It is important that each CAT-ASVAB subtest be at least as reliable as its paper-pencil counterpart. This report presents two methods for estimating subtest reliabilities of the CAT version of the ASVAB, and illustrates them using data from the experimental version. These methods can be used with later versions.

CRC 0205710000/Final Unclassified CPR

*A Stable Curvilinear Alternative to Linear Equating* (U) October 1987

DR Divgi

28pp, CNA, MCG, Repository

(U) In any ongoing testing program, new forms of a test are developed and equated to an earlier form. Linear equating is often used when the new form is nearly parallel to the old one, but it can lead to substantial systematic errors. This research contribution proposes and evaluates a new method for test equating. The method combines the stability of linear equating and small bias of equipercentile equating. See also 02 057100.00

CRM 2787016100/Final Unclassified CPR

*Properties of Some Bayesian Scoring Procedures for Computerized Adaptive Tests* (U) August 1987

DR Divgi

24pp, CNA, NMC, Repository

(U) The computerized adaptive version of the Armed Services Vocational Aptitude Battery will use a Bayesian procedure for computing test scores. Properties of three common Bayesian procedures are examined in this research memorandum. The results show that the procedures are almost equally reliable and that reliability drops if item parameters change from paper-pencil to computerized administration.



CRC 0205620000/Final Unclassified CPR

*Development of 10th Grade Norms for the ASVAB* (U) May 1987

DR Divgi, GE Horne

68pp, CNA, MCG, Repository

(U) The Armed Services Vocational Aptitude Battery (ASVAB) is administered in high schools and postsecondary schools as part of the Defense Department's Student Testing Program. Unit 1986, high school norms based on a national sample, were available for grades 11 and 12 only. These were computed from data collected in 1980 as a part of the Profile of American Youth (PAY) study. Additional data from a nonrandom sample were collected in 1984 by the Military Entrance Processing Command (MEPCOM). The objective of the present study was to develop norms for 10th grade. Tenth grade norms were developed by transforming MEPCOM cumulative percentages into national percentile scores. Transformation curves were obtained by combining information from MEPCOM and PAY samples in grades 11 and 12. The average transformation was then used in 10th grade to convert MEPCOM cumulative percentages into national percentile scores.

CRM 2787005500/Final Unclassified CPR

*Scaling the Proposed New Armed Forces Qualification Test Composed of Verbal, Arithmetic Reasoning, and Math Knowledge* (U) April 1987

MH Maier, CM Hiatt

60pp, CNA, MCG, Repository

(U) The Numerical Operations (NO) subtest has caused problems for the joint-service testing program since it was made part of the Armed Forces Qualification Test (AFQT) in 1980. A new AFQT, in which the Math Knowledge (MK) subtest replaces NO, was recommended by the Joint Service Selection and Classification Working Group in 1986. The purpose of this research memorandum is to present percentile score norms for the proposed new AFQT in the 1980 Youth Population and the scaling of the current forms of the AFQT to the 1980 score scale.

CRM 2787000600/Final Unclassified CPR

*Equivalent-Groups Versus Single-Group Equating Designs for the Accelerated CAT-ASVAB Project* (U) January 1987

PH Stoloff

33pp, CNA, MCG, Repository

(U) Before a Computerized Adaptive Testing (CAT) version of the Armed Services Vocational Aptitude Battery (ASVAB) can be implemented it must be equated to the pencil-and-paper version. This Research Memorandum reports analysis on the appropriateness of various equating designs.

CRM 2786022800/Final Unclassified CPR

*Evaluating the Appropriateness of the Numerical Operations and Math Knowledge Subtests in the AFQT* (U) November 1986

MH Maier, CM Hiatt

112pp, CNA, MCG, Repository

(U) The Numerical Operation (NO) subtest, used in the Armed Forces Qualification Test (AFQT), has a history of causing problems for the Armed Services Vocational Aptitude Battery (ASVAB) score scale. Two adjustments to the ASVAB score scale have been required since NO was made part of the AFQT in 1980. The purpose of this report is to present evidence that the NO subtest should be deleted from the AFQT and be replaced by the Math Knowledge (MK) subtest. Data are presented showing that the AFQT scores in 1984 were inflated by approximately three percentile score points.

CRM 2786023100/Final Unclassified CPR

*On Some Issues in the Accelerated CAT-ASVAB Project* (U) November 1986

DR Divgi

36pp, CNA, MCG, Repository

(U) The Accelerated Computerized Adaptive Testing (CAT) - Armed Services Vocational Aptitude Battery (ASVAB) Project (ACAP) may serve as the pilot version for national implementation of CAT for the ASVAB. Two major decisions in the ACAP involve the introduction of new items into the tests, and setting time limits. This research memorandum takes the position that the long-term benefits which CAT may provide are more important than purely technical concerns and makes recommendations based on this position.

CRM 2786018900/Final Unclassified CPR

*Determining the Sensitivity of CAT-ASVAB Scores to Changes in Item Response Curves with the Medium of Administration* (U) August 1986

DR Divgi

37pp, CNA, MCG, Repository

(U) Within a few years the Department of Defense may begin administering the Armed Services Vocational Aptitude Battery (ASVAB) using Computerized Adaptive Testing (CAT). In CAT, each test item is characterized by an Item Response Curve (IRC), which describes how the probability of correctly answering the item increases with ability. A recent study conducted by the Center for Naval Analyses found that IRCs of many items in the experimental CAT item pool for the ASVAB changed substantially from paper-pencil to CAT administration. This research memorandum examines the effects of these changes on scores of individual examinees.

CNR 9401160000/Final Unclassified CPR

*The ASVAB Score Scales: 1980 and World War II* (U) July 1986

MH Maier, WH Sims

160pp, CNA, MCG, Repository

(U) This report describes the construction of a new score scale for the Armed Services Vocational Aptitude Battery (ASVAB). The ASVAB was administered to a nationally representative sample of young adults in the fall of 1980. The test scores for this sample were used to construct the new score scale, called the 1980 ASVAB score scale. On 1 October 1984, the 1980 score scale replaced the World War II scale, used by the Department of Defense (DoD) since 1950. The new score scale provides nationally representative test norms that enable DoD personnel and manpower managers to compare the aptitudes of military recruits with those of the potential supply of recruits in the civilian youth population.

CRM 2786015100/Final Unclassified CPR

*Subpopulation Differences in Equating Computerized Adaptive and Paper-and-Pencil Versions of the ASVAB* (U) June 1986

PH Stoloff

48pp, CNA, MCG, Repository

(U) Computerized Adaptive Test (CAT) and Paper-and-Pencil (PP) Armed Services Vocational Aptitude Battery (ASVAB) scores are equated in several subpopulations to determine if racial minorities, females, those who did not complete high school, or individuals lacking experience using computers would be at a disadvantage if CAT rather than PP scores were used for selection. Equating is generally independent of population group.

CRM 2786013500/Final Unclassified CPR

*Effects of Using Subtest Standard Scores in Calculating AFQT Percentile Scores* (U) May 1986

GE Horne

24pp, CNA, MCG, Repository

(U) The Armed Forces Qualification Test (AFQT) is currently constructed from a sum of subtest raw scores converted to percentile scores. This paper examines advantages and disadvantages of constructing AFQT percentile scores from sums of subtest standard scores.

CRM 2786011100/Final Unclassified

*Evaluation of Alternative Compositions of the Armed Forces Qualification Test (AFQT)* (U) May 1986

GE Horne

56pp, CNA, MCG, Repository

(U) This paper evaluates seventeen ASVAB composites that were proposed as alternatives to replace the current AFQT. The alternatives are evaluated primarily on the basis of their predictive validity and their effects on the applicant pool.

CRM 2786008600/Final Unclassified CPR

*Inconsistent Scores on Speeded ASVAB Subtests* (U) April 1986

GE Horne

46pp, CNA, MCG, Repository



(U) Data is presented showing that results on high school ASVAB speeded subtests are inconsistent with results on nonspeeded subtests. Causes for the inconsistencies are explored, and corrective actions based on these findings are recommended.

CRM 2786002400/Final Unclassified CPR

*Effect of the Medium of Administration on ASVAB Item Response Curves* (U) April 1986

DR Divgi, PH Stoloff

330pp, CNA, MCG, Repository

(U) Within a few years the Department of Defense may begin administering the Armed Services Vocational Aptitude Battery (ASVAB) using Computerized Adaptive Testing (CAT). Each test item is characterized by an Item Response Curve (IRC), which describes how the probability of correctly answering the item increases with ability. One important question in the CAT project is whether the IRCs are the same in paper-pencil and CAT administrations. This paper examines this issue.

CNR 9401130000/Final Unclassified CPR

*Equivalence of Scores From Computerized Adaptive and Paper-and- Pencil ASVAB Tests* (U) November 1985

PH Stoloff

85pp, CNA, MCG, Repository

(U) The Department of Defense plans to introduce a Computerized Adaptive Test (CAT) version of the Armed Services Vocational Aptitude Battery (ASVAB) in the near future. To maintain continuity of enlistment standards, the test scores from the current paper-and-pencil and CAT version of ASVAB must be equated. This report examines data from an administration of an early version of CAT to ascertain if any serious problems are likely to occur when equating CAT and paper-and-pencil scores.

CNR 9401100000/Final Unclassified

*Extent of Cheating on ASVAB FY 1976 Through FY 1984* (U) November 1985

WH Sims, AR Truss, MD Curia

121pp, CNA, MCG, Repository

(U) The Armed Forces currently use the Armed Services Vocational Aptitude Battery (ASVAB) to measure the mental aptitude of applicants for enlistment. Certain minimum scores on the ASVAB are required to qualify for enlistment and, it is well known that some individuals have circumvented these requirements by cheating. The purpose of this report is to integrate and provide more complete documentation for a number of short-term analyses of the cheating issue. Estimates of the extent of cheating are made by applying an internal consistency check to recent ASVAB data from all branches of the armed services. The extent of cheating throughout the Department of Defense is examined, and implications of the findings for joint-service ASVAB testing policy are assessed.

CRM 2785004000/Final Unclassified CPR

*Effects of Truncating a Reference Population on Correction of Validity Coefficients for Range Restriction* (U) June 1985

MH Maier

25pp, CNA, MCG, Repository

(U) Correlation coefficients based on samples from occupational specialties that differ in qualification standards cannot be compared. The sample coefficients need to be put on the same metric by correcting them to a common reference population. The purpose of this analysis is to evaluate the effects of truncating the reference population on the correlation coefficients and on the inter-correlation of performance measures. Population wide estimates were computed in the full population and in the truncated population with the bottom 10 percent deleted.

CRC 0204570000/Final Unclassified CPR

*Original Scaling of ASVAB Forms 5/6/7: What Went Wrong?* (U) May 1983

MH Maier, AR Truss

153pp, Repository

(U) Addresses the concerns of personnel managers about the accuracy of the ASVAB score scale. The report attempts to determine the causes of the error in the scale and to verify that the corrections to the scale did in fact restore the traditional meaning of the ASVAB scores.

## Recruiting

### Marine Corps

CQR D0003778.A1/Final Unclassified

*Marine Corps Officer Recruiting Structure Study* (U) April 2001

A Jareb, L Parker

76pp, CNA, ISO, OTT, Repository

(U) The Marine Corps Officer Recruiting Structure Study examines the potential officer candidate market and develops several different officer recruiting structure alternatives. Among the alternatives are officer recruiting structures that conform to existing Marine Corps District boundaries and others that do not, but are purely based on the potential officer candidate market.

CRM D0001694.A2/Final Unclassified

*Marine Corps Recruiting Structure Study* (U) August 2000

A Jareb, L Parker, I Cardenas

52pp, CNA, RAD, WET, Repository

(U) The Marine Corps current recruiting structure is unbalanced. Large disparities in recruiters, mission, and market among the two regions, six districts, and forty-eight recruiting stations pose a risk to the recruiting service's ability to make its mission. For these reasons, and because a comprehensive structure review has not been conducted for a number of years, the Commanding General, Marine Corps Recruiting Command (MCRC) chartered a National Structure Working Group (NSWG) to examine current MCRC structure and develop a better one. CNA was asked to provide analysis support to the NSWG. This research memorandum describes and documents analysis performed from September 1999 to June 2000.

CME D0000070.A1/Final Unclassified

*Marine Corps Recruiting Structure Study: Preliminary Courses of Action* (U) January 2000

A Jareb, L Parker, I Cardenas

96pp, CNA, PAD, WET, Repository

(U) This annotated briefing describes the development of preliminary alternative courses of action for modifying the Marine Corps' recruiting structure.

CRM 2799011400/Final Unclassified

*Officer and Enlisted Accession and Retention Study Issues* (U) November 1999

AO Quester, AM Adedeji, CS Moore, CM Hiatt

101 pp. CNA, RAD, Repository

(U) The Officer and Enlisted Accession and Retention study address four issues Manpower and Reserve Affairs identified as needing further research and analysis to help the Marine Corps most cost-effectively man its force. The first issue explores first-term and career force mix, looking at the experience mix within the first-term force and changes in the force mix for particular Occfields. The second issue examines Basic Electronic Course qualification scores, looking at the impact of the lower cutoff score on performance. The third issue evaluates the Prior-Service Enlistment Program, comparing attrition rates of PSEP Marines and on-prior-service-first-termers. It also evaluates the success of the program in filling occupational shortages in the Corps. The final issue evaluates the cost and retention effectiveness of the Marine Corps' aviation bonus program, focusing on what bonus levels are needed to meet retention goals in each officer community.

CRM 2794005500/Final Unclassified

*Marine Corps Enlistment Guarantee Programs* (U) June 1994

JH North

74pp, CNA, AQS, Repository, Paper, DTIC: AD-B195108

(U) The Marine Corps asked CNA to determine whether present enlistment guarantee programs are efficient mechanisms for providing the Marine Corps with trainable recruits. A review of the literature suggested that much is known about the recruiting impact of enlistment guarantees, but little is known about their post-accession effect. We looked at four measures of these post-accession effects: (1) Non-end-of-active-service (non-EAS) attrition; (2) Non-

EAS attrition following Military Occupational Specialty (MOS) assignment in less popular MOSs; (3) Time to receipt of MOS; and (4) Monthly allocation of enlistment guarantee quotas. For the first three measures, our goal was to isolate the effect of each enlistment guarantee type. For the fourth measure, we wanted to determine what allocation of guarantee quotas would cause the shortest delays between Marine Corps Combat Training and MOS school training.

CRM 27930013100/Final Unclassified

*Targeting Officer Recruiting Goals and Resources* (U) July 1993

JH North, KD Smith

73 pp, CNA, AQS, Repository

(U) The Marine Corps recruits and screens about 2,000 officer candidates annually. Recruiting minority candidates who meet its stringent standards, however, is not easy. Recruiting qualified minorities is especially difficult because of stiff competition from other services, industry, government, and the academic arena. Consider these statistics: (1) of male college graduates in 1990-91, five percent were African-Americans, and three percent were Hispanics; (2) only two percent of males with Scholastic Aptitude Test (SAT) scores meeting USMC standards were African-American, and four percent were Hispanic.

CRM 2791023000/Final Unclassified

*Seasonal Patterns in the Senior and Graduate Markets for Marine Corps Recruits* (U) March 1992

JH North

53pp, CNA, OPS, Repository, Paper, DTIC: AD-B171172

(U) This research memorandum examines the effects of the time of the year when a contract is signed on Delayed-Entry-Program (DEP) and early-first-term (15 month) attrition rates. The study population consists of male seniors and graduates who signed their contracts in FY 1987 and FY 1988. The seasonal variations in contracts, accessions, and DEP length for graduates and seniors are examined.

CRM 2791012700/Final Unclassified CPR

*Analysis of Support Funding for Marine Corps Recruiting* (U) January 1992

JH North

54pp, CNA, OPS, Repository, Paper, DTIC: AD-A254597

(U) The main objective of this study is to identify an improved method for allocating Marine Corps recruiter support funds to the districts. This research memorandum describes a way to account for variation in the average support cost across the Marine Corps recruiting districts. Using FY 1989 and 1990 data, certain variables are found to explain recruiting station support funding costs. Model estimates are made of FY 1992 district support funding requirements. In addition, estimates are made of support cost savings from proposed station consolidations.

CRM 2791016200/Final Unclassified

*Production-Weighted Qualified Military Available: A Review of the Methodology and Further Analysis* (U) December 1991

JH North

43pp, CNA, OPS, Repository

(U) In FY 1991, the Marine Corps adopted a new method for allocating recruiters and recruiting quotas that is based on production-weighted qualified military available. This research memorandum explains how the new system works and addresses some of the concerns that have been raised regarding its effectiveness.

CRM 2789028000/Final Unclassified

*Evaluation of the USMC QMA-Based Recruiting Goaling System and a Proposed Alternative* (U) April 1990

GE Horne, JS Hughes, WH Sims

62pp, CNA, FSA, Repository

(U) The objective of this analysis is to evaluate and improve the system used by the Marine Corps to allocate recruiters and enlistment quota among various levels of its recruiting organization. Suggestions for improving the system are given. A new basis for allocation is proposed along with a method for evaluating candidate allocation systems. Reallocation of recruiting assets is suggested.

CRM 2789025200/Final Unclassified

*Minority Officer Recruiting Goal Allocations* (U) November 1989

PF Kostiuik

62pp, Repository

(U) This research memorandum documents a methodology for allocating minority officer recruiting goals across Marine Corps recruiting districts. Using data on historical minority officer accessions and college entrance examination test scores, district goals are calculated for black and Hispanic officer accessions.

CRM 2789011400/Final Unclassified CPR

*Relative Average Recruiting Yields by AFQT Category* (U) May 1989

J Hughes, WH Sims

22pp, CNA, NMC, Repository

(U) The number of recruits enlisted from a target population varies significantly by aptitude score. This memorandum calculates the ratio of recruits to population by AFQT category for the fiscal years 1980 to 1987.

CRM 2788019000/Final Unclassified CPR

*Physical Fitness of Marine Corps Recruits* (U) April 1989

TE Rupinski

45pp, CNA, NMC, Repository

(U) The Marine Corps views the physical fitness of every Marine as essential to its overall effectiveness. This research memorandum reviews the Physical Fitness Test (PFT), estimates the effect of height and weight measures on the PFT scores of recruits, assesses the need for minimum and maximum weight standards, and forecasts the impact of alternative accession standards on physical fitness.

#### **General DOD/Other Services (with potential interest to the Marine Corps)**

CAB D0001623.A2/Final Unclassified

*Evaluation of Home School and National Guard Youth ChalleNGe Program Recruits: Status Report* (U) September 2000

FE Garcia, J Gasch, Brian Ray

34pp, CNA, RAD, WET, Repository

(U) The Conference Report of the National Defense Authorization Act for Fiscal Year 1999, Section 571, directed the establishment of a 5-year pilot program requiring the military services to move graduates of home schools and graduates of the National Guard youth ChalleNGe program holding general Education Development (GED) diplomas from Tier II priority status to Tier I for enlistment purposes. The Directorate for Accession Policy, Office of the Assistant Secretary of Defense (Force Management Policy) has tasked CNA to assess the following issues: how can recruiters reach home schoolers; how can recruiting commands identify genuine home school graduates; how does the performance of home school graduates and ChalleNGe graduates with GEDs compare with that of other recruits; and, what is the recruiting market potential of home school graduates and ChalleNGe graduates with GEDs. In the months ahead, a special collection of the Youth Attitude Tracking Study will be conducted from youth in each target population to obtain detailed marketing information. Answers to the following questions will be sought: what are their enlistment propensity levels; would they be interested in participating in the Junior ROTC program; what benefits/incentives would be most attractive to them; what specific forms of advertising would be most effective; and, what characterizes ChalleNGe graduates who enlist?

CRM D0001288.A1/Final Unclassified CPR

*An Evaluation of the Proposed Average-Strength Scheme* (U) May 2000

G Cox

35pp, CNA, RAD, WET, Repository, Unlimited Distribution

(U) Early in FY00, the U.S. Army asked each of the other services to consider joining it in proposing, through the Unified Legislative and Budgeting (ULB) process, legislation that would change the military's personnel target from an end-strength goal to a goal based on average strength, calculated across the fiscal year. The Deputy Chief of Naval Operations, Manpower and Personnel (N1) asked CNA to evaluate the average-strength scheme to help the U.S. Navy formulate its response to the Army. We provided the N1 staff an earlier draft of this report that raised concerns about the scheme (as this final version of the report continues to do). The Navy shared the draft report with the Army, which decided not to continue pursuing the proposal.

CAB 4799013600/Final Unclassified

*Youth Demographic Trends And The Future Recruiting Environment: IWAR Report* (U) December 1999

CS Moore, HS Griffiths

36pp, CNA, RAD, Repository

(U) To support the Integrated Warfare Architectur (IWAR) study effort, N81 asked CNA to predict the supply of potential enlisted recruits over the next decade and beyond. In this report, we discuss relevant trends and changes that the Navy can expect. We examine the future population of youth aged 17 to 26 to estimate the number that will be eligible for, and have a propensity for, military service. This information will facilitate long-term planning of recruiting resources.

CRM 2799002000/Final Unclassified

*An Econometric Analysis of the Enlisted Goaling Model* (U) June 1999

DD Goldhaber

31pp, CNA, SPM, Repository

(U) The Navy uses the Enlisted Goaling Model to predict the supply of net new A-cell recruit contracts. Commander, Navy Recruiting Command (CNRC) requested that CNA reexamine and refine the econometric specification of the goaling model to ensure that it was predicting the supply of available recruits with the highest degree of accuracy possible. This report investigates whether the inclusion of alternate variables increases the accuracy, whether the basic form also serves to predict recruit contracts for a higher quality subset of A-cells, and whether the appropriate supply model for workforce recruits is significantly different from the model for high school seniors.

CAB 4796008300/Final Unclassified

*'True Cost of a Sailor' Study: Methodology and Preliminary Results* (U) September 1996

HL Eskew

14pp, CNA, SPM, Repository

(U) The Director of the Naval Center for Cost Analysis asked CNA to participate in the design and implementation of a study relating to indirect costs of naval personnel. This annotated briefing documents our participation to date.

CRM 2788002700/Final Unclassified CPR

*Recruiting Resources and Policies* (U) May 1988

TW Cooke

42pp, CNA, NMC, Repository

(U) How can Commander, Navy Recruiting Command, manage enlisted recruiters more cost effectively to provide the needed quantity and quality of recruits? The Recruiting Resources and Policies Study addressed this question by examining geographic variation in enlistment goals, recruit production, and recruiter incentives. This research memorandum summarizes the study and highlights the major policy implications.

CRM 2787014500/Final Unclassified CPR

*Issues in Estimating Enlistment Supply* (U) August 1987

PF Kostiuk

28pp, CNA, PML, Repository

(U) Over the past two decades there have been numerous studies of military enlistment supply. This research memorandum analyzes several key econometric issues in the estimation of enlistment supply models. The analysis focuses on the role of goals, the problems of measurement error, and the simultaneity between the variables used in empirical analyses and unobserved factors. Several econometric methods are proposed as possible solutions.

PP 5500043300/Final Unclassified CPR

*The All Volunteer Force: Outlook for the Eighties and Nineties* (U) March 1984

AO Quester, RF Lockman

17pp, CNA, NPM, Repository

(U) Discusses the question – Should we keep the All Volunteer Force or return to conscription.

## Reserves

### Marine Corps

CRM 2792018200/Final Unclassified CPR

*USMC Active and Reserve Force Structure and Mix Study: Volume I: Summary* (U) December 1992

HD Lyons, WH Sims, JD Goetke

56pp, CNA, OPR, Repository

(U) This research memorandum summarizes CNA's analysis of Marine Corps forces for the congressionally mandated Active and Reserve Force Structure and Mix Study. It discusses the historical use of the Marine Corps Reserve in the Korean and Persian Gulf Wars, legislation pertaining to Marine Corps force structure, the Marine Corps' implementation of Total Force Policy, development of alternative force structures, and preparation of reserve forces for war. It also discusses ten alternative force structures. The analysis of alternative force structures considers the capability to respond to future contingencies, peacetime forward-presence/rotation capability, reserve force sustainability, total number of personnel in active forces and the Selected Marine Corps Reserve, transition costs, and steady-state costs. See also 27 920161, 27 920168, 27 920180, and 27 920185.

CRM 2792016800/Final Unclassified CPR

*USMC Active and Reserve Force Structure and Mix Study, Volume II: History and Policy* (U) October 1992

HD Lyons, JD Goetke

50pp, CNA, OPR, Repository

(U) This research memorandum is the second in a set of five volumes documenting the Marine Corps Active and Reserve Force Structure and Mix Study. This volume examines the Marine implementation of Total Force Policy and two historical uses of the Marine Corps Reserve in regional conflict (the Korean and Persian Gulf wars). See also 27 920161, 27 920180, 27 920182, and 27 920185.

CRM 2792018500/Final Unclassified CPR

*USMC Active and Reserve Force Structure and Mix Study: Volume III, Development of Alternative Structures and Estimates of Training Times* (U) December 1992

WH Sims

41pp, CNA, OPR, Repository

(U) This research memorandum is the third in a set of five volumes addressing Marine Corps active and reserve force structure and mix. This volume develops an inclusive set of options that are analyzed in detail in volume IV. It also makes detailed estimates of the post-mobilization training time needed by reserve units. See also 27 920161, 27 920168, 27 920180, and 27 920182.

CRM 2792016100/Final Unclassified CPR

*USMC Active and Reserve Force Structure and Mix Study, Volume IV: Analysis of Alternative Force Structures and Mixes* (U) December 1992

HD Lyons, JD Goetke

121pp, CNA, OPR, Repository

(U) This research memorandum is the fourth in a set of five volumes addressing the Marine Corps Active and Reserve Force Structure and Mix Study. This volume addresses the following aspects for each of the force mixes studied: capability to respond to future contingencies, capability to provide peacetime forward presence/rotation, reserve force sustainability, total number of personnel in active forces and the Selected Marine Corps Reserve, transition costs, and steady-state costs. The roles of the Individual Ready Reserve are also discussed. See also 27 920168, 27 920180, 27 920182, and 27 920185.

CRM 2787023600/Final Unclassified

*Some Aspects of Implementing an Austere, Off-the-Shelf Attack Helicopter Augmentation Program* (U) January 1988

RS Feldman

41pp, CNA, NMC, Repository

(U) Issues concerning the augmentation of the current Marine Corps attack helicopter force with an austere, off-the-shelf attack helicopter are discussed in this research memorandum. It addresses five specific issues: alternative off-

the-shelf helicopters; billet availability through force restructuring; alternative attack helicopter support for Maritime Prepositioning Ships (MPS) forces; Civil Reserve Air Fleet (CRAF) concept for attack helicopters; and lease-versus-buy considerations. These issues are largely an extension of topics discussed in an earlier CNA study.

CRM 2787016400/Final Unclassified

*The Effect of Personal Characteristics on Attrition from the Selected Marine Corps Reserve* (U) August 1987

LJ May

102pp, CNA, NMC, Repository

(U) Currently, the Selected Marine Corps Reserve (SMCR) does not have detailed attrition data on enlisted personnel. This research memorandum calculates the level of attrition from the SMCR for enlisted personnel and characterizes the losses in terms of the personal characteristics of those who leave. Empirical attrition and survival rates are calculated for several personnel categories differentiated by sex, age, marital status, service history, race, and education. A model of attrition, which allows for the simultaneous impact of several personal characteristics on attrition behavior, is estimated.

CRC 0205190000/Final Unclassified

*Cost Analysis of Selected Units in the Marine Corps Active and Reserve Components* (U) April 1984

PF Kostiuk

41pp, CNA, MCP, Repository

(U) This research contribution analyzes the potential cost savings that could be achieved by transferring units or missions from the active Marine Corps to the Selected Marine Corps Reserve (SMCR). A methodology for comparing annual operating costs of similar units in the active and reserve components is developed and applied to a Marine Corps infantry battalion and CH-46E squadron. The paper then estimates the start-up costs for the transfer of units and missions to the reserves, and compares total expenditures over a 3-year period for different scenarios.

#### **General DOD/Other Services (with potential interest to the Marine Corps)**

CRM 2792020600/Final FOUO

*U.S. Navy Active and Reserve Forces in Transition: From the Maritime Strategy to the Gulf War and Beyond* (U)

January 1993

JV Hall

30pp, CNA, OPR, Repository

(U) This research memorandum provides a basis for formulating and assessing alternative active/reserve naval force structures. First, it compares planning for the Naval Selected Reserves under the Maritime Strategy of the 1980s with the actual use of Selected Reservists in the Gulf War. Based on the Gulf War experience, it then estimates requirements for the Selected Reservists in two concurrent major regional conflicts.

CRM 2791018700/Final Unclassified

*Desert Storm Reconstruction Report, Volume XI: Medical* (U) October 1991

AD Burns, AE Graham, LS Keefer

60pp, CNA, OPR, Repository

(U) This volume of the Desert Storm Reconstruction Report describes the medical support provided by the Navy during Desert Shield/Desert Storm and discusses the lessons learned during the operation.

CRM 2791015300/Final Unclassified

*Preparations for Casualty Regulating and CONUS Care During Operation Desert Storm* (U) October 1991

AE Graham, AD Burns

33pp, CNA, OPS, Repository

(U) This research memorandum describes the system established to regulate the flow of Desert Storm casualties from theater and the build-up of capabilities in the Continental U.S. (CONUS) to receive casualties. The focus is on the Navy's part in the build-up and the role of the Navy reserves in expanding the capabilities of CONUS facilities.

CRM 2788018900/Final Confidential

*Contingency Manning for the Ready Reserve Force: Can Adequate Manpower Be Provided?* (U) November 1988

ES Cavin

29pp, CNA, NWO, Repository



(U) As the U.S. commercial fleet has declined in recent years, concern has grown that it may not be able to satisfy strategic mobility requirements in a military emergency. Therefore, reserve fleets (most notably, the Ready Reserve Force (RRF)) have been established to augment U.S. sealift capability. However, there remains the question of how to man the reserve fleets during mobilization, if the main source of manpower would be the active merchant mariner pool, which is declining with the U.S. merchant fleet. This research memorandum estimates time-phased manpower requirements for the reserve fleets, and assesses the ability of the active manpower pool to satisfy the demand for merchant mariners.

CRM 2787023900/Final Unclassified CPR

*Enlistment Supply into the Naval Reserve* (U) December 1987

PF Kostiuik, JE Grogan

32pp, CNA, NMC, Repository

(U) Although many studies of military enlistment have been conducted during the last two decades, few have analyzed the reserve component. This research memorandum develops and estimates an econometric model of enlistments for the Naval Reserve. The analysis incorporates factors such as size of recruiting force, Navy veteran population, local unemployment rates, civilian wages, and recruiting goals.

CRM 2786004200/Final Unclassified CPR

*A Technique for Estimating the Effect of Pay on Selected Reserve Supply* (U) March 1986

BJ Asch

28pp, CNA, PML, Repository

(U) Two policies for achieving Selected Reserve manning goals are to increase Reserve pay and to increase recruiting efforts. This paper discusses methods of estimating the effect of these policies on enlisted Selected Reserve supply.

CRM 2785003100/Final Unclassified

*Personnel Costs of Navy Active and Reserve Forces* (U) May 1985

RS Feldman

26pp, CNA, PML, Repository

(U) Recent national interest in integrating Reserve and Active forces into a unified concept for mobilization has focused attention on improving our capabilities for assessing the costs of Reserve forces. This memorandum addresses one component of Reserve costs-personnel-and shows how assessment of Reserve personnel costs differ from that for Active personnel.

PP 5500041300/Final Unclassified CPR

*Naval Reserve Forces Throughout the World* (U) February 1984

AO Quester, AS Sicilia

23pp, Repository

(U) This paper looks at the components of the U.S. Naval Reserve, and makes comparisons of active/reserve force mixes among the U.S. and twenty other countries with large navies.



## Retention/Attrition

### Marine Corps

CAB 4799009000/Final Unclassified CPR

*MCRD Attrition and Comparisons with the Navy* (U) July 1999

AO Quester

34pp, CNA, RAD, Repository

(U) This briefing examines bootcamp attrition in the Navy and the Marine Corps, comparing recent attrition rates, historical rates, and FY99 predictions. Recent bootcamp attrition in the Navy has been considerably higher than in the past; however, Marine Corps bootcamp attrition is well within the historical averages for both males and females. The briefing also examines Marine Corps bootcamp attrition for regulars and reserves, looking at the two Marine Corps Recruit Depots (MCRDs) in San Diego and Paris Island.

CRM 2799011400/Final Unclassified

*Officer and Enlisted Accession and Retention Study Issues* (U) November 1999

AO Quester, AM Adedeji, CS Moore, CM Hiatt

101 pp. CNA, RAD, Repository

(U) The Officer and Enlisted Accession and Retention study address four issues Manpower and Reserve Affairs identified as needing further research and analysis to help the Marine Corps most cost-effectively man its force. The first issue explores first-term and career force mix, looking at the experience mix within the first-term force and changes in the force mix for particular Occfields. The second issue examines Basic Electronic Course qualification scores, looking at the impact of the lower cutoff score on performance. The third issue evaluates the Prior-Service Enlistment Program, comparing attrition rates of PSEP Marines and on-prior-service-first-termers. It also evaluates the success of the program in filling occupational shortages in the Corps. The final issue evaluates the cost and retention effectiveness of the Marine Corps' aviation bonus program, focusing on what bonus levels are needed to meet retention goals in each officer community.

CAB 4799007600/Final Unclassified

*Ideas for the Marine Corps Aviation Retention Bonus Program* (U) July 1999

CS Moore

30pp, CNA, RAD, Repository

(U) This analysis, part of CNA's Officer and Enlisted Accession and Retention Issues Study, examines the Marine Corps aviator retention bonus. The report looks at what years of service should be targeted with the bonus, what bonus levels are needed to meet the retention goals in each community, and ways the Marine Corps can improve its aviation bonus program. The study recommends targeting O-4 requirements, which may entail offering bonuses to O-5s as well to prevent pay inversion. It also concludes that different communities will require varying bonuses to meet requirements.

CRM 2796008200/Final Unclassified

*Monetary Incentives in the Selected Marine Corps Reserve* (U) October 1996

FE Garcia, DL Reese

48pp, CNA, SPM, Repository

(U) The Selected Marine Corps Reserve (SMCR) targets bonuses to personnel in occupations with manpower shortages. The SMCR uses bonuses infrequently, often will below the total allocation. The Marine Corps believes that the SMCR is underutilizing its bonus program. To ensure maximum use and efficiency of the program, the Marine Corps has asked CNA to answer the following questions: 1) Do bonuses improve personnel retention in the SMCR? 2) What is the most effective method for selecting bonus-eligible military occupational specialties, occupational fields, and units? 3) Is there an alternative realignment of the bonuses by timing of installments, type of contract, and dollar amount?

CRM 2796005400/Final Unclassified

*Marine Corps Entry-Level Training Attrition* (U) May 1996

AM Jareb

60pp, CNA, SPM, Repository, Limited External

(U) This research memorandum identifies several alternatives for reducing attrition in Marine Corps entry-level training. These alternatives are based on an analysis of trends in entry-level-training attrition, and they focus on reducing physical attrition. The author estimates the effect of these alternatives on attrition. He estimates that physical attrition accounts for: 32 percent of male recruit separations, 28 percent of female recruit separations, more than half of Marine Combat Training (MCT) separations; and almost two-thirds of infantry Military Occupational Specialty (MOS) training separations. In this study, CNA is tasked to examine the causes of attrition from recruit training, MCT, and initial infantry MOS training. (Strictly speaking, entry-level training includes all initial MOS skill training. However, the tasking is limited to the training described above.) The objects of the study are to: quantify, in detail, the entry-level training attrition the USMC is experiencing; identify several possible changes the USMC may make to potentially reduce this entry-level training attrition; and estimate the attrition reduction associated with any possible changes.

CRM 2794010500/Final Unclassified

*A Cost-Effective Use of Selective Reenlistment Bonuses and Lateral Occupational Moves* (U) September 1994

JH North

122pp, CNA, AQS, Repository, Paper, DTIC: AD-B198128

(U) As part of the Military Occupational Specialty (MOS) Assignment, Allocation, and Incentive Analysis study, the Marine Corps asked CNA to determine whether current reenlistment incentives are efficient. Also, they asked CNA to improve on present reenlistment forecasts. Earlier CNA analysis suggested that it may not be necessary in certain cases to provide Marines reaching the end of their first terms of enlistment with a monetary incentive to reenlist. In MOSs with expected shortfalls in the number of Marines willing to reenlist, planners can increase the inventory by doing one of two things: (1) Offer selective reenlistment bonuses in the short MOS; or (2) Allow Marines in MOSs with an oversupply of reenlisters to move laterally into the short MOSs. This research memorandum provides an MOS-by-MOS comparison of the costs of these two alternatives. We calculate the costs of retraining Marines who make lateral moves. We also estimate the probability of reenlistment for Marine with less than 72 months of service, or Zone A Marines. From these estimates, we calculate the cost of additional reenlistments generated by using selective reenlistment bonuses. We then compare these costs and apply the results to the FY 1995 Zone A reenlistment plans to develop cost-effective selective reenlistment bonus and lateral move plans.

CRM 2792022500/Final Unclassified CPR

*How Successful Are Lateral Occupational Specialty Moves?* (U) September 1993

JH North

63pp, CNA, AQS, Repository, Paper, DTIC: AD-B181810

(U) As part of the study Managing the Enlisted Marine Corps in the 1990s, CNA analyzed success patterns of Marines making lateral moves. Each of these Marines retrain in a primary military occupational specialty different from the original one. The Marine Corps currently has no basis for judging the success of Marines initiating lateral moves. Our analysis of historical data provides planners with information to help judge the efficiency of these moves. We will first describe the Marine Corps manpower planning and how lateral moves fit into this planning. We then consider the costs of selective reenlistment bonuses versus lateral moves. Finally, we provide statistical analysis of historical data on lateral moves. Our analysis of lateral moves focuses on the following considerations: (a) patterns of successful completion of a lateral move; (b) the promotion and attrition experience of Marines who have made lateral moves relative to their cohorts; and (c) experience in the Marine Corps compared with performance of occupation-related tasks.

CRM 2792017500/Final Unclassified

*Modifications to the Method for Determining First-Term Reenlistments* (U) March 1993

JH North

38pp, CNA, AQS, Repository

(U) This research memorandum discusses FY 1993 changes in the method used to determine first-term reenlistment targets by primary military occupational specialty. These changes incorporate newly available information and improve the accuracy of the estimates.

CRM 2792020000/Final Unclassified CPR

*First-Term Attrition in the Marine Corps* (U) March 1993

AO Quester

38pp, CNA, AQS, Repository

(U) This research memorandum provides an overview of first-term attrition in the Marine Corps. It discusses trends in attrition, the timing and costs, and the historical relationship between attrition rates and recruit characteristics. Finally, it briefly discusses reasons for separation.

CRM 2792018900/Final Unclassified CPR

*Career Reenlistments in the Marine Corps: FY 1980 Through FY 1991* (U) December 1992

AO Quester, KS Lawler

83pp, CNA, AQS, Repository

(U) This research memorandum analyzes the 1980 to 1991 reenlistment decisions of enlisted Marines with 6 through 14 years of service.

CRM 2792008500/Final Unclassified

*Determining the Number and Composition of First-Term Reenlistments: The First-Term Alignment Plan (FTAP)* (U) October 1992

JH North, AO Quester

79pp, CNA, OPS, Repository, Paper, DTIC: AD-B171734

(U) This research memorandum describes how the Marine Corps First-Term Alignment Plan (FTAP) was constructed from FY 1988 through FY 1991 and how the FTAP was constructed for FY 1992. FTAP determines the number of first-term reenlistments that will be permitted in each of the Marine Corps primary military occupational specialties. As such, it is an important tool for aligning occupational requirements with inventory.

CRM 2791023000/Final Unclassified

*Seasonal Patterns in the Senior and Graduate Markets for Marine Corps Recruits* (U) March 1992

JH North

53pp, CNA, OPS, Repository

(U) This research memorandum examines the effects of the time of the year when a contract is signed on Delayed-Entry-Program (DEP) and early-first-term (15 month) attrition rates. The study population consists of male seniors and graduates who signed their contracts in FY 1987 and FY 1988. The seasonal variations in contracts, accessions, and DEP length for graduates and seniors are examined.

CRM 2790021910/1Rev Unclassified

*Rankings by Historical Attrition Rates of Potential Marine Corps Recruits* (U) September 1991

JH North, AM Adedeji

43pp, CNA, OPS, Repository

(U) In response to a request by the Marine Corps Recruiting Command, CNA has categorized and ranked potential Marines based on their historical non-end of service attrition rates. Separate rankings have been made for enlisted men and women with categorization based on age, Armed Forces Qualification Test category, education, whether direct ship or delayed-entry program participant, and whether the recruit met the in-service weight-for-height standard.

CRM 2791006400/Final Unclassified CPR

*Reenlisting in the Marine Corps: The Impact of Bonuses, Grade, and Dependency Status* (U) July 1991

AO Quester, AM Adedeji

117pp, CNA, OPS, Repository

(U) First-term reenlistment decisions for recommended and eligible Marines in FY 1980 through FY 1990 are analyzed in this research memorandum. Particular attention is given to the retention effects of selective reenlistment bonuses on Marines in different Armed Forces Qualification Test score categories. Additionally, reenlistment behavior for Marines of different marital statuses, grades, and length of initial enlistment contracts are analyzed.

CRM 2790007100/Final Unclassified CPR

*Enlisted Women in the Marine Corps: First-Term Attrition and Long-Term Retention* (U) August 1990

AO Quester

41pp, CNA, FSA, Repository

(U) This research memorandum provides an overview of gender differences in the continuation rates for enlisted Marines. It also contains a detailed analysis of first-term attrition for female recruits with four-year obligations accessed in FY 1981 through FY 1985. In this analysis, female first-term attrition probabilities are modeled as a function of background characteristics at entry into the Marine Corps.

CRM 2790006200/Final Unclassified

*Length of Time in the Delayed-Entry Program and Its Effect on Marine Corps First-Term Survival* (U) August 1990

JH North

36pp, CNA, FSA, Repository

(U) This research memorandum examines the effects of length of time in the Delayed Entry Program (DEP) on 6- and 45-month active-duty survival rates for male and female Marines entering the Marine Corps in FY 1984. The results show large increases in male 6- and 45-month survival rates as potential recruits spend up to three months in the DEP. Beyond three months, there is little further increase in survival rates. No systematic relationship is found between length of time in the DEP and survival rates for female Marines.

CRM 2789031410/1REV Unclassified CPR

*Identifying Successful Marine Corps Recruits* (U) April 1990

AO Quester, JH North, TH Kimble

59pp, CNA, NMC, Repository, Paper, DTIC: AD-A233136

(U) This research memorandum briefly reviews trends in Marine Corps first-term attrition and then analyzes recruit background characteristics and Marine Corps environment variables associated with successful adaptation to Marine Corps life. Three measures of success are examined: completion of the first term of service, completion of the first term of service at the rank of corporal, and retention beyond the initial service obligation.

CRM 2789020700/Final Unclassified

*Enlisted Marine Corps Active-Duty Physical Disability Separations with Severance Pay: FY 1979 through 1988* (U) December 1989

AO Quester

78pp, CNA, FSA, Repository

(U) This research memorandum describes active duty enlisted physical disability separations from the Marine Corps in the 1979 to 1988 time period. The particular emphasis is on physical disability separations with severance pay.

CRM 2789023000/Final Unclassified

*Discharge Reasons for Enlisted Marines: FY 1979 through FY 1988 Separations* (U) September 1989

AO Quester, RT Taggart

61pp, CNA, NMC, Repository

CRM 2789016800/Final Unclassified CPR

*Tradeoffs in Using Alternative Height-Weight Standards* (U) August 1989

TE Rupinski

44pp, CNA, NMC, Repository

(U) This research memorandum examines the feasibility of realigning the weight standards of the Marine Corps to make them more equitable between genders without reducing quality standards. The tradeoffs between equity and recruit quality are summarized to assist policymakers in selecting the appropriate weight standards.

CRM 2789001600/Final Unclassified

*Using Attrition Rates in Setting Height-Weight Standards* (U) May 1989

TE Rupinski

63pp, CNA, NMC, Repository

(U) This research memorandum evaluates the relationship between height-weight standards and attrition of Marines within their first term of service. Attrition rates by educational status are compared to attrition rates by weight to establish a link between accession and active duty standards.

CNR 9401390000/Final Unclassified CPR

*A Study of Marine Corps Family Programs* (U) September 1987

ES Cavin

80pp, CNA, NMC, Repository

(U) The Family Service Centers (FSCs) present a diverse set of services to Marines and their families. This report presents the results of a study of Marine Corps family programs provided by the FSCs. These services include personal, family, and financial counseling, employment assistance, help for victims of domestic violence, and other services. Data from the 1985 DOD Member and Spouse surveys, USMC exit questionnaires, administrative records, and special purpose surveys of FSC directors and Marine unit commanders are used to assess the success of FSCs in meeting the objectives of serving commanders and Marines and their families and to estimate the impact of family programs on Marine retention.

CNR 9401380000/Final Unclassified

*The Retention Effects of Selective Reenlistment Bonuses in the United States Marine Corps* (U) August 1987

DJ Cymrot

132pp, CNA, NMC, Repository

(U) This report analyzes the Selective Reenlistment Bonuses program in the United States Marine Corps. The analysis focuses on the effect of this program on the retention of Marines. Retention has two components: reenlistments and extensions, where only reenlistments of four years or more are eligible for bonuses. The analysis shows a strong correspondence between bonuses and the reenlistment rate.

CRM 2787016400/Final Unclassified

*The Effect of Personal Characteristics on Attrition from the Selected Marine Corps Reserve* (U) August 1987

LJ May

102pp, CNA, NMC, Repository

(U) Currently, the Selected Marine Corps Reserve (SMCR) does not have detailed attrition data on enlisted personnel. This research memorandum calculates the level of attrition from the SMCR for enlisted personnel and characterizes the losses in terms of the personal characteristics of those who leave. Empirical attrition and survival rates are calculated for several personnel categories differentiated by sex, age, marital status, service history, race, and education. A model of attrition, which allows for the simultaneous impact of several personal characteristics on attrition behavior, is estimated.

CNR 9401420000/Final Unclassified

*Attrition in the Selected Marine Corps Reserve* (U) December 1987

LJ May

114pp, CNA, NMC, Repository

(U) This report calculates aggregate and disaggregate attrition rates from the Selected Marine Corps Reserve. The attrition rate is calculated over a six-year period for several groups of enlisted personnel and by individual units. Losses are described in terms of the personal characteristics of those who leave as well as local-unit characteristics. A model of attrition that allows for the joint impact of personal and geographical-unit characteristics on attrition behavior is estimated.

CRM 2787016300/Final Unclassified

*Attrition from the Selected Marine Corps Reserve: Enlisted Prior-Service and Non-Prior-Service Reservists* (U)

August 1987

LJ May

60pp, CNA, MCG, Repository

(U) The Selected Marine Corps Reserve (SMCR) does not have comprehensive attrition data, an important factor in making a cost-effective selection of personnel. The Marine Corps is able to measure accurately only net losses from the Selected Reserve. Aggregate net losses are measured by comparing beginning and end strengths to the number of new accessions. Therefore, current methodology for calculating gross attrition rates does not yield any information on the timing or characteristics of the losses. This research memorandum provides detailed information on the timing and characteristics of the losses of enlisted personnel.

CRM 2787009100/Final Unclassified

*Extension and Subsequent Reenlistment in the United States Marine Corps* (U) June 1987

DJ Cymrot

70pp, CNA, MCG, Repository

(U) The subsequent reenlistment decisions of Marines who extend their active term of service rather than reenlist or leave is examined. The theoretical analysis places the phenomena of extensions within the generally accepted framework for studying retention. The empirical analysis assesses the importance of understanding extension behavior to manpower and budget planners.

CNR 9400340000/Final Unclassified CPR

*U.S. Marine Corps Enlistment Bonus Program* (U) March 1984

CA Palomba

172pp, Repository

(U) This study is an analysis of the United States Marine Corps Enlistment Bonus Program (EBP). The study's main objectives were to determine the effect of the EBP on enlistment supply and report measures of cost effectiveness, and determine the effect of the EBP on recruit quality, affirmative action, and early separation from the Marine Corps. Based on our analyses we believe the EBP should be continued. Also, we believe numerical quotas for the bonus program should be set high enough so that all funds allocated for bonuses are used.

CRC 0204640000/Final Unclassified CPR

*A User's Manual for Retention Goal Calculations* (U) August 1982

LJ Grike

61pp, Repository

(U) This report is a user's manual for a set of programs used to calculate Marine Corps retention goals for individual commands, given overall Marine Corps retention goals. The programs allow adjustments to differentiate between usual and early reenlistments and to account for differences in the situations of individual commands. Current goals consider commands' occupational field compositions; programs are also provided for the case in which occupational fields are not considered.

#### **General DOD/Other Services (with potential interest to the Marine Corps)**

CAB 4799008400/Final Unclassified CPR

*Seasonal Patterns in SEA Fleet Gains and Losses* (U) October 1999

JA Arkes, HS Griffis

48pp, CNA, RAD, Repository

(U) Historically, the level of fleet manning has varied over the course of the year. Arrivals to and departures from the sea fleet have not coincided well, resulting in significant understaffing at certain times of the year. The objective of this report is to recommend policy options to bring about better matching of enlisted sea gains and losses to reduce the seasonal variation in sea manning. We first document the pattern of seasonal variation. We then decompose the transitions to and from the sea fleet to determine the sources of the variation. Finally, we offer an initial look at certain policies that aim to reduce the seasonal variation. We find substantial variation in sea manning over the course of the year for both E1-E4 and E5-E9 sailors. The main contributor to the seasonal variation in E1-E4 net gains is strength losses at End of Active Obligated Service dates (EAOSs). We construct several policy options that aim to reduce seasonal variation by shifting these EAOSs dates so that they match sea gains more closely.

CAB 4798006510/1Rev Unclassified CPR

*Youth Smoking In The Country And In The Military: Findings And Ideas* (U) January 1999

AO Quester

48pp, CNA, SPM, Repository

(U) This briefing examines the rising number of youth smoking in the United States, the effects smoking has on bootcamp performance, the success of cessation programs in the military, and proposes several ideas for future research. The report argues that because of the large numbers, captive audience, and collection of useful data, bootcamp provides a unique setting for testing smoking intervention strategies. The briefing concludes by addressing the problems the military exchanges will face if a substantial federal tax on cigarettes becomes law.

DTIC AD-A360279

CAB 4798009000/Final Unclassified CPR  
*Perstempo and Stressing the Force* (U) August 1998  
LC Cavalluzzo, JA Arkes

39pp, CNA, SPM, Repository

(U) This annotated briefing summarizes the results of an investigation of perstempo levels, trends and implications conducted for the Personnel Readiness Division of the Joint Chiefs of Staff. This paper looks at indicators, short of personnel losses, of the impact of perstempo on enlisted personnel readiness, with the aim being to shed light on the level of perstempo that can be tolerated before the negative effects of excessive perstempo show up in declining retention rates. We found some evidence of increased dissatisfaction with military pay and military life, as well as some increases in use of family service programs that help with stress, as perstempo increases. Marines, who had the largest role in Desert Shield/Desert Storm, showed the strongest indication of stress from deployment to that environment. The report also provides charts of perstempo trends for selected occupational specialties in each of the services.

CAB 4796006610/1Rev Unclassified  
*California Navy Recruits With Prior Arrest Histories* (U) September 1996  
HS Griffis, D Gregory, AM Flyak

25pp, CNA, SPM, Repository

(U) Early in 1996 the Under Secretary of the Navy tasked the Assistant Secretary of the Navy, Manpower and Reserve Affairs (ASN (M&RA)), with conducting an in-depth review of Department of the Navy policies on recruiting people with preservice arrest histories. Part of this report was generated by two recent papers on unsuitability discharge patterns among FY85-89 enlisted recruits from California. ASN (M&RA) tasked CNA to sue the same dataset to validate the claims made in the earlier papers before any policy changes based on this information are considered. This annotated briefing summarizes our results.

CAB 4795012900/Final Unclassified  
*Some Ideas for Relatively Low-Cost, Potentially High-Impact, Quality-of-Life Improvements* (U) March 1996  
JL Gasch, AO Quester

24pp, CNA, SPM, Repository

(U) One of CNA's tasks in the Rethinking Navy Manpower and Personnel study was to identify a collection of relatively low-cost, potentially high-impact ideas to improve the quality of life for sailors. This annotated briefing contains our response to that tasking. Quality of life improvement ideas include: paying sailors every other Friday; reevaluating hours for Navy facilities; providing secure, off-site parking for single sailors living on ships; rethinking liberty/leave rules; providing e-mail/internet access for sailors; installing telephones in all BQ rooms; and giving more recognition for a good job.

CAB 4795010200/Final Unclassified  
*Issues for Navy Senior Executive Service (SES) Force Management* (U) October 1995  
JS McMahon

20pp, CNA, SPM, Repository

(U) An important issue for Navy Senior Executive Service (SES) force management is to project future retirements for SES members, both on an aggregate level and for major occupational groups. The purpose of this effort is to provide information regarding future SES recruiting opportunities -- to allow planners to focus on the development of employees in the SES pipeline. We decided to look at the Navy SES for as many years as we could obtain data. In the end, we looked at data from 1980 through 1994. We present our analysis in two ways. First, we show the historical patterns of inventory, separations, and retirements. Second, we build a behavioral model to try to predict retirement behavior.

CAB 4795007700/Final Unclassified  
*Recruit Quality and Attrition: The Puzzle of Recent Trends* (U) July 1995  
DJ Cymrot

27pp, CNA, SPM, Repository

(U) Over the last 15 years, the armed services have applied a lot of resources to improve the quality of recruits and thereby reduce attrition. As quality has improved, however, the rate of attrition has not fallen. The persistence of attrition could have several negative consequences. One, it increases the future recruiting mission. With limited



resources, a high recruiting requirement may not be achievable. Two, it might undermine the Navy's (and the other services') argument for high-quality recruits even though high quality may be needed for factors other than the low attrition. Given these potential negative, it is important to understand this apparent mystery. This briefing addresses the basic question Why hasn't first-term attrition decreased as recruit quality has increased?

CRM 2791015000/Final Unclassified CPR

*Personnel Tempo of Operations and Navy Enlisted Retention* (U) February 1992

TW Cooke, AJ Marcus, AO Quester

99pp, CNA, OPS, Repository

(U) This research memorandum documents analyses of the relationship between Personnel Tempo of Operations (PERSTEMPO) and enlisted retention. CNA's ship employment history files were used to reconstruct the PERSTEMPO experience of each surface ship since the mid-1970s. This PERSTEMPO information was added to the personnel records of sailors making retention decisions while aboard surface ships in the FY 1979 through FY 1988 period. Finally, information on pay, civilian employment opportunities, and bonuses was added to each sailor's record. A statistical regression technique was used to explore the relations between PERSTEMPO and retention. A by-product of the study is updated estimates of the relationship and relative military pay, unemployment rates, and selective reenlistment bonuses.

CRM 2791007100/Final Unclassified

*Deployment Length, Turnaround Time, and Retention Aboard Aircraft Carriers* (U) September 1991

TW Cooke, AJ Marcus

23pp, CNA, OPS, Repository

(U) This research memorandum examines the effect of OPNAV Instruction 3000.13, Personnel Tempo of Operations, on deployment length and turnaround time for deploying units from the late 1970s through FY 1988. It also examines the relationship between deployment length and retention for samples of people who served aboard aircraft carriers during this period.

CRM 2790022900/Final Unclassified

*Delayed Entry and Attrition: A Review* (U) April 1991

TW Cooke, DM Pflaumer

39pp, CNA, OPS, Repository

(U) The Delayed Entry Program (DEP) allows new recruits to delay commencement of active duty for up to one year. CNA was tasked to review studies of DEP attrition and first-term attrition. These studies evaluated the relationship between individual characteristics, service policy variables, and DEP and first-term attrition. This research memorandum reviews and interprets recent empirical evidence on recruit participation in the DEP, DEP attrition, and active-duty attrition.

CRM 2790005700/Final Unclassified

*A Shift-Share Analysis of First-Term Attrition* (U) December 1990

TW Cooke, JE Grogan, RT Taggart

82pp, CNA, FSA, Repository

(U) This research memorandum analyzes how changes in the characteristics of Navy and other service recruit cohorts affected recent first-term attrition rates. The Navy analysis uses the Success Chances for Recruits Entering the Navy data base. A similar analysis is done for the other services, using data from the Defense Manpower Data Center. Changes in attrition rates are separated into expected and unexpected components based on observed FY 1984 cohort attrition behavior.

CRM 2789019300/Final Unclassified CPR

*Costs of Improving Recruit Aptitudes: A Joint Product Approach* (U) July 1990

TW Cooke, JM Jondrow

41pp, CNA, FSA, Repository

(U) This research memorandum presents and applies a methodology for estimating the cost of recruiting individuals with alternative distributions of Armed Forces Qualification Test (AFQT) scores. The methodology takes account of the key institutional features of the recruiting process, including recruiter time allocation and procedural guidelines. The method is used to estimate the costs of different recruit-aptitude distributions, using data on applicants and accessions for all of the services.

CRM 2790002000/Final Unclassified CPR

*Factors Associated with Navy First-Term Attrition Losses: Female Accessions in FY 1983 Through FY 1985* (U)

June 1990

AO Quester

54pp, CNA, FSA, Repository

(U) This research memorandum examines first-term attrition for female recruits accessed in the FY 1983 through FY 1985 period. Female first-term attrition probabilities are modeled as a function of background characteristics at entry into the Navy.

CRM 2789001710/1Rev Unclassified

*First-Term Navy Attrition* (U) November 1989

TW Cooke, AO Quester

48pp, CNA, NMC, Repository

(U) This research memorandum documents first-term attrition in the years of the all-volunteer force. The focus is on recent increases in attrition for recruits accessed since FY 1986. It presents the historical correlates of attrition and examines pattern in reasons for and authority for discharge. Also, for the first time, patterns and trends in first-term attrition within and between activities, including carriers, surface combatants, submarines, squadrons, and amphibious units, are analyzed.

CRC 0205780000/Final Unclassified CPR

*Is There Such A Thing As Overall Satisfaction With Military Life? A Factor Analysis of Marine Corps Data* (U)

February 1988

ES Cavin

21pp, CNA, NMC, Repository

(U) This research contribution attempts to determine the number of dimensions in which satisfaction with military life should be measured. The analysis used a correlation matrix of satisfaction measures for Marine respondents to the 1985 DOD Member Survey and performed a standard factor analysis on that matrix. Three distinct dimensions of Marine satisfaction, having to do with personal fulfillment in the military, military family stability, and military fringe benefits, were identified.

CRC 0205080000/Final Unclassified

*The Effect of PCS Moves on Military Wives' Earnings and Husbands' Retention* (U) April 1984

LS Jacobson, JE Thomason

17pp, CNA, NSG, Repository

(U) This paper presents estimates of the earnings lost by service wives because of permanent changes of station. The losses were determined from data in the Current Population Survey matched with Summary Earnings Records of the Social Security Administration. The paper also presents estimates of the proportion of husbands deterred from reenlisting and the cost to replace them. Finally, it suggests several actions that might be taken to mitigate these effects.

## Education/Training

### Marine Corps

CRM 2797004800/Final Unclassified

*Fixing How the Marine Corps Gets to the Fight: Volume I (Main Text) (U) June 1997*

MB Geis, TA Bowditch, JT Dworken, MA Wigge

111pp, CNA, OPS, Repository

(U) In recent years, the necessity for military forces to get to the "fight" quickly and efficiently has been demonstrated frequently in real-world operations such as Desert Shield/Storm, Restore Hope, and Joint Endeavor. The process by which the marine Corps gets its forces to the fight is known as force deployment planning and execution (FDP&E). Unfortunately, how the Marine will get to the fight is often viewed as much less important (and less interesting) than how they will fight once they get there. This viewpoint has led to a number of deficiencies in the force deployment process. These deficiencies have the potential to seriously affect future operations, and the costs could be enormous. If the Marine Corps intends to remain the nation's premier crisis response force, it must address the underlying causes of these deficiencies. This report is the first of a two-volume set that presents our findings. This study addresses why FDP&E is a problem for the Marines, and what they can do to fix the problem. The study was sponsored by COMMARFORPAC, COMMARFORLANT, and the Marine Corps Combat Development Command (MCCDC). This volume provides the overview of the study findings, and presents our recommendations. See also CRM 97-49.

CAB 4797001700/Final Unclassified

*Marine Corps Force Deployment Planning and Execution: Key Problem Areas (U) May 1997*

MB Geis, TA Bowditch, JT Dworken

39pp, CNA, OPS, Repository

(U) The role of the U.S. Marine Corps as the nation's premier crisis response force depends on its ability to plan for and execute force deployment operations on short or no notice. But recent joint exercises and real-world operations have brought to light problems that frequently degrade the effectiveness of Marine Corps force deployment operations. Although the symptoms are familiar, such as frequent last-minute changes to the Time-Phased Force Deployment Data (TPFDD), delayed arrival of forces into theater, and improper phasing of forces into theater), the root causes of the problem are not well understood. The Commander, U.S. Marine Corps Forces, Atlantic (COMMARFORLANT); the Commander, U.S. Marine Corps Forces, Pacific (COMMARFORPAC); and the Director, Training & Education Division, Marine Corps Combat Development Command (MCCDC) asked CNA to explore the problems associated with force deployment planning and execution (FDP&E), identify their causes, and recommend potential solutions. This briefing provides an interim status update on our most recent work for this study.

CRM 2791008900/Final Unclassified

*Marine Corps Training Concepts, Issues, and Analyses (U) September 1991*

KD Smith

59pp, CNA, OPS, Repository

(U) This research memorandum contains the final report of the Marine Corps Training Concepts Study. Based on extensive interviews, the study identified training issues facing the Marine Corps and investigated analytical methods and sources of training data. This paper discusses the state of training data and the concept of training effectiveness. The training standard is highlighted as the central tool in training. Ten issues are singled out as potential study topics. The background of each issue and the data and methods with which each could be studied are considered.

CRM 2790013400/Final Unclassified

*The Marine Corps Aviator Training Pipeline (U) January 1991*

PF Kostiuik

30pp, CNA, FSA, Repository

(U) This research memorandum describes the operation of the training pipeline for Marine Corps student naval aviators and student naval flight officers. Distinct phases of training are identified and the lengths and locations of

the various phases are described. The memorandum also describes the types of data needed to provide timely information on training activities.

#### **General DOD/Other Services (with potential interest to the Marine Corps)**

CRM 2798013800/Final Unclassified

*Analysis of Student Not-Under-Instruction Time in Initial Skills Training: Trends, Causes, and Proposed Fixes* (U) January 1999

SW Belcher, VA Reinert, CM Hiatt

98pp, CNA, SPM, Repository

(U) The time students spend at school is either time under instruction (UI) or time not under instruction (NUI). NUI has three components: awaiting instruction time, interrupted-instruction time, and awaiting-transfer time. The Chief of Naval Education and Training (CNET) asked CNA to examine the flow of students through initial skills training, address the major causes of NUI time in initial skills training, and examine how the Navy can reduce the amount of NUI time students are spending at school. For each component of NUI, we first discuss the major cause and then recommend ways to reduce the levels. DTIC AD-B242417

CRM 2790018100/Final Unclassified

*A Methodology for Determining Aviation Training Rates* (U) January 1991

DJ Cymrot, AR Zeman

38pp, CNA, OPS, Repository

(U) Training rates for pilots (PTR) and naval flight officers (NFOTR) represent the number of aviators completing training in a given year. This research memorandum critiques the current methodology used by the Navy to calculate the required PTR and NFOTR, and offers an alternative approach. This approach is embodied in a computer model. Various factors that influence the training rates under this approach are discussed and alternative uses for the model are explored.

CIM 9501160000/Final Unclassified

*User's Guide for the CNA Aviation Training Rate Model* (U) November 1990

AR Zeman, DJ Cymrot

70pp, CNA, FSA, Repository

(U) The Center for Naval Analyses has developed the Aviation Training Rate (ATR) model, which calculates the training rates for pilots and naval flight officers based on a set of user defined inputs. This manual is a guide for users of the ATR model. It discusses in detail all the command options in the model and presents specific examples of its uses.

CRM 2787017100/Final Unclassified

*An Analysis of "BRASS CREEP"* (U) August 1987

DJ Cymrot, RL Peck

32pp, CNA, PML, Repository

(U) The decline in enlisted-to-officer ratio in recent years has been labeled "brass creep," which is meant to imply that the officer corps has grown too large. This research memorandum analyzes trends in the enlisted-to-officer ratio in the Navy and proposes an explanation for a recent decline in this ratio based on reasons of efficiency.

CRM 2786005300/Final Unclassified

*Officer Graduate Education in the Navy* (U) April 1986

RF Lockman, DJ Cymrot, MA Richardson, MS Murray

34pp, CNA, PML, Repository

(U) The graduate education levels and fields of Naval officers in key leadership and management billets are examined in this paper. Officer graduate education levels are compared with those of managers of large multinational U.S. firms, the upper levels of the Navy civil service, and other U.S. and foreign military services. The memorandum also discusses the effects of graduate education on the productivity of officers and civilian corporate managers and evaluates the subspecialty coding of at-sea billets and graduate education for systems acquisition management.

# Manpower Requirements

## Marine Corps

CRM 2792008500/Final Unclassified

*Determining the Number and Composition of First-Term Reenlistments: The First-Term Alignment Plan (FTAP)* (U) October 1992

JH North, AO Quester

79pp, CNA, AQS, Repository

(U) This research memorandum describes how the Marine Corps First-Term Alignment Plan (FTAP) was constructed from FY 1988 through FY 1991 and how the FTAP was constructed for FY 1992. FTAP determines the number of first-term reenlistments that will be permitted in each of the Marine Corps primary military occupational specialties. As such, it is an important tool for aligning occupational requirements with inventory.

CRM 2786013300/Final Unclassified

*Analysis of the Cost and Lift Requirements for Medium-Range RPV Ground Control Stations* (U) May 1986

OH Paananen, DJ Jenkins

41pp, CNA, MCG, Repository

(U) This research memorandum analyzes the cost, manpower, and lift requirements of two alternative concepts for Ground Control Stations (GCSs) for medium-range remotely piloted vehicles (RPVs). The alternative systems are compared in terms of life-cycle cost, lift area, and weight of components of the GCSs.

## General DOD/Other Services (with potential interest to the Marine Corps)

CRM D0000862.A2/Final Unclassified

*Staffing Standards for Coast Guard Groups, Stations, and Aids-to-Navigation Teams Task 2: Gather Data* (U) June 2000

W Sims, R Buck

141pp, CNA, ATS, MSU, Repository

(U) The United States Coast Guard, Office of Boat Forces (G-OCS), Boat Force Planning Division (G-OCS-1), has developed various automated applications to track personnel assignment, workload, and performance parameters and to highlight gaps and excesses in current staffing. The Coast Guard believes that existing staffing standards are dated. The office asked The CNA Corporation to update both the staffing standards and the software for the current staffing model. This report describes data collected to support workload estimates, analysis, and model development.

CRM D0000295.A1/Final Unclassified

*Staffing Standards for Coast Guard Groups, Stations, and Aids-To-Navigation Teams, Task 3: Develop Model Requirements* (U) January 2000

R Buck, W Sims

92pp, CNA, OEG, Repository

CRM D0002238.A2/Final Unclassified

*Staffing Standards for Coast Guard Groups, Stations, and Aids-to-Navigation Teams (ANTS) Task 4: Analyze Data Volume II: ANTs* (U) February 2001

R Buck

114pp, CNA, TSA, MSU, Repository

(U) The United States Coast Guard (USCG), Office of Boat Forces (G-OCS), Boat Planning Division (G-OCS-1) has developed various automated applications to track personnel assignment, workload, and performance parameters and to highlight gaps and excesses in current staffing. The Coast Guard believes that existing staffing standards do not reflect current operational, administrative, and boat and facilities maintenance activities. Thus, the office is updating the 1989 staffing standards for groups, stations, and aids-to-navigation teams (ANTS) and has asked The CNA Corporation to update both the staffing standards and the software for the staffing model. The analysis described in this report considers workload activities identified in a dictionary of activities (DOA) used to gather

survey information in 1998 and 1999 from an original sample of 38 ANTs. Other workload activities were added based on reviews of ANT routine.

CRM D0002364.A2/Final Unclassified

*Staffing Standards for Coast Guard Groups, Stations, and Aids-to-Navigation Teams (ANTs): Task 4: Analyze Data Volume III: Groups* (U) February 2001

R Buck, KB Nordstrom

173pp, CNA, TSA, MSU, Repository

(U) The United States Coast Guard (USCG), Office of Boat Forces (G-OCS), Boat Force Planning Division (G-OCS-1) has developed various automated applications to track personnel assignment, workload, and performance parameters and to highlight gaps and excesses in current staffing. The Coast Guard believes that existing staffing standards do not reflect current operational, administrative, and boat and facility maintenance activities. There is also concern that inadequate staffing may result in overworked and undertrained personnel and contribute to operational errors. Thus, the office is updating the 1989 staffing standards for Groups, Stations, and Aids-to-Navigation Teams (ANTS) and has asked CNAC to update both the staffing standards and the software for the staffing model, which we refer to as the Boat Forces (Group/ Station/ANTS) Staffing Model (BFSM). The analysis process described in this report considers workload activities identified in the 1993 "Group Releveling Plan" and a dictionary of activities (DOA) used to gather survey information, in the spring of 2000, from 21 stand-alone groups, 15 composite groups, 2 activities, and 1 group-like detachment. Other workload activities are added based on reviews of Group operations. Fundamental workload variables are identified and used wherever data are available. Where such data are not available, or where work parameters are unknown, survey data are used.

CAB D0002055.A1/Final Unclassified

*Recommended Communicator Capabilities and Manning Requirements for MSC Ships* (U) July 2000

HQ Nguyen

22pp, CNA, TSA, ITO, Repository

CRM D0000164.A1/Final Unclassified

*Enlisted Environmental Safety Rating* (U) January 2000

R Filadelfo, J Mintz, J Gasch, PE Speer

56pp, CNA, RAD, RES, Repository

(U) The Director, Environmental Protection, Safety, and Occupational Health Division (N45) asked CNA to examine the need for an enlisted shipboard environmental protection/safety specialist rating, to help him decide whether he should consider creating such a rating. This report documents the results of that study. The first section describes the safety/EP requirements and how ships are organized to meet these requirements. The next sections review current safety/EP performance and other (fleet) issues associated with the current system. The last section discusses alternative shipboard safety/EP organizations.

CRM 2798011500/Final Unclassified

*Marine Manpower Requirements for CASS Technicians, IMA (MOS 6467)* (U) September 1998

JP Hall, MJ Giovachino, BH Measell

13pp, CNA, SPM, Repository

(U) The Consolidated Automated Support System (CASS) is a computerized automatic test equipment system that is now being fielded by the Department of the Navy. It is designed to be a common tester that can support all the electronic test requirements of the Navy and DoD. The Director of Navy's Air Warfare Division (N88) and the Support Equipment Program Officer (PMA-260) asked us to review the Navy's plans for implementing CASS within the Navy and Marine Corps and help determine the manpower and the quantity and types of CASS stations that are needed. The average number of operators based on CASS availability and operator productivity varied from a low of 1.07 (CASS availability of 50 percent and a productive workweek of 84 hours) to a high of 2.57 (CASS availability of 100 percent and a productive workweek of 67 hours).

CRM 2796012400/Final Unclassified

*Manpower Requirements for CASS Operators* (U) March 1997

MJ Giovachino

24pp, CNA, SPM, Repository

(U) The Consolidated Automated Support System (CASS) is a computerized automated test equipment (ATE) system now being developed by the Department of the Navy. It will be used aboard aircraft carriers, by Marine Corps Aviation Logistics Squadrons (MALS), and at Navy and Marine Corps shore facilities to test and repair aircraft parts. The Director of the Navy's Air Warfare Division (N88) and the Support Equipment Program Office (PMA-260) asked CNA to review the Navy's plans for implementing CASS within the fleet. CNA is helping the Department of the Navy determine the quantity and types of CASS stations and the manpower required to support the Navy and the Marine Corps. In this study, we used an expected value calculation on data from eight different cruises to determine the number of operators required per CASS bench. We will discuss how the 1992 USS KITTY HAWK data set, used in a previous study, compared with the other cruises. In addition, we discussed our reasons for using an expected value approach and the limitations of the Aviation Logistics Model (ALM) in determining man-per-bench requirements.

CAB 4796011400/Final Unclassified

*Potential for Ship Manning Reductions from New Information Systems Technology* (U) January 1997

WH Simms

29pp, CNA, RAS, Repository

(U) Historically, manning reductions have often been proposed, but they rarely have been achieved. The projected savings are often not realized, or, if savings are realized, they are immediately spent on improved capability. Ships today are certainly more capable than their predecessors. Meaningful manning reductions may well be achieved. This document discusses the affect new information systems technologies may or may not have on the issue.

CRM 2795022210/1Rev Unclassified CPR

*Improving Internal Navy Allocation Decisions: The Case of Military Manpower* (U) May 1996

AJ Marcus

32pp, CNA, SPM, Repository

(U) In a period of shrinking resource, the Navy is searching for ways to reduce the costs of operating and supporting its forces. Those savings can be used to help recapitalize the Navy as the turn of the century approaches. Past efforts at reducing support costs have often focused on outsourcing or privatizing work that can be done commercially. Evidence from past research indicates that savings are available from outsourcing work and from public-private competitions. The evidence indicates that the pressure of competition, among private sector firms and between government activities and the private sector, is the source of those savings. In the Program Objectives Memorandum (POM) process, resource sponsors pay a price for each billet they authorize. The Navy has begun to include more explicit personnel costs in the POM process. This paper considers the potential for how that cost information may improve manpower resource decisions and examines broader decision-making frameworks as well.

CAB 4795013100/Final Unclassified

*Exploring the Potential and Payoffs of Carrier Manning Reductions* (U) January 1996

JB Newman

39pp, CNA, OPR, Repository

(U) Assessments (N8) asked CNA to support the Director, Air Warfare Division in a long-term project to investigate future air-sea basing alternatives for the twenty-first century. The analysis presented in this briefing was part of CNA's support to the N88 long-term project. Previous CNA analysis supporting the N88 project, which investigated alternative paths for a future sea-based Tactical Aircraft (TACAIR) platform, showed that personnel costs are the single largest cost element, or about one-third of the life-cycle costs of aircraft carriers. Because affordability is a major concern for the future sea-based TACAIR platform, we investigated the potential for life-cycle cost savings resulting from reduced manning on a future platform. This briefing explores the potential for cost savings and the impact of reduced manning on capabilities. The values of costs, savings, and capabilities presented in this briefing are only rough estimates. We have tried to ensure that the values used are realistic, but they are not precise. They should be regarded as only a rough order of magnitude.

CRM 2794009800/Final Unclassified

*A Workforce Forecasting Model and Applications to the DOD Financial-Management Community* (U) February 1994

WH Sims

193pp, CNA, FPD, Repository



(U) In this research memorandum, we describe a simple workforce projection model that forecasts expected numbers of personnel in individual occupations and groups for six years into the future. Such a forecasting capability may have broad applicability in workforce planning throughout the Department of Defense (DoD). The "top-down" model used takes the Future Years Defense Program (FYDP) manpower-ceiling numbers as the major external influence driving the workforce. We model the responses of components of the workforce individually in terms of a long-term trend and the historical response pattern of each component to changes in the agency FYDP manpower ceilings.

CAB 4793002300/Final Unclassified

*Evaluating Contractor Base Operating Support (BOS) : The Case of Submarine Base Bangor* (U) October 1993

JD Keenan, AJ Marcus

18pp, CNA, AQS, Repository

(U) This briefing was prepared in response to a request from N80 to examine the efficiencies in cost and operation of a naval base operating under a large multifunction support contract. Recent analyses by CNA predict significant savings if various base operating functions now performed by Navy civilian or military personnel were competitively outsourced. This means that fewer and/or less expensive contractors could replace government personnel on shore duty. The Navy has 25 bases or activities that operate under large multifunction support contracts. Of these, the contract at Submarine Base Bangor (Washington) is the second largest, the most complex, and the longest running. The Headquarters of the Commander of the Pacific Fleet is concerned because Bangor and other bases with large base operating support contracts are very expensive to operate. This case study investigates whether that concern is valid. Our approach is to compare the costs of Bangor with those of a control base (New London), and then to evaluate the implications for savings through outsourcing.

CRM 2792002800/Final Unclassified

*Historical Manning of Aircraft Carriers* (U) July 1992

WH Sims

58pp, CNA, OPR, Repository

(U) This research memorandum, completed as part of the Future Carrier Study, documents the manning of U.S. aircraft carriers from 1956 through 1991.

CRM 2791010400/Final Unclassified

*Some Evidence on How the Navy's Manpower Ashore Varies with Manpower at Sea* (U) July 1991

SD Kleinman

26pp, CNA, FSD, Repository

(U) The shore establishment expands and contracts with changes in the forces at sea, and the extent to which this occurs is the subject of this analysis. This research memorandum examines how Navy manpower ashore has changed in relation to manpower at sea. For the years 1968 through 1990, the numbers of civilians, officers, and enlisted personnel ashore are each related to the numbers of military personnel afloat. Alternative models are used to predict how a cut in at-sea manning would affect manning ashore.

CRM 2789008800/Final Unclassified CPR

*Some Design Requirements for a Steady-State Force Model* (U) August 1989

DM Rodney

28pp, CNA, NMC, Repository

(U) This research memorandum describes the approach being used to develop an executable and cost-effective steady-state force. The issues that need to be incorporated into the derivation of a steady-state force model are addressed. The memorandum highlights, by way of examples, numerous ways in which personnel policies and billet structure may be inconsistent, thus making it impossible to execute all policies simultaneously and obtain the required force structure.

CRM 2788009500/Final Unclassified

*FFG-7 Class Manning Study Final Report: Manpower Requirements Analysis* (U) February 1989

DM Rodney, MB Geis, JL Hill

53pp, CNA, NMC, Repository

(U) Manpower requirements in the FFG-7 class of guided-missile frigates have increased. Manning is being constrained by berthing limitations. This research memorandum reviews the Ship Manpower Document

methodology (SMD), including its strengths and weaknesses. Data collected from a number of FFG-7 Class frigates in the Pacific Fleet are analyzed to determine the differences between actual manning practices and the levels specified in the SMDs.

CRC 0205760000/Final Unclassified

*Aviation Logistics Model* (U) January 1988

JD Parsons, SC Goodwyn

54pp, CNA, NWO, Repository

(U) The Aviation Logistics Model (ALM) is a simulation of aircraft carrier aviation maintenance and supply that is used to study alternative aviation logistics policies. ALM is not a Monte Carlo model, but it is designed to take full advantage of the structured maintenance data collected on the Visual Information Display System/Maintenance Action Forms (VIDS/MAFS). This research contribution documents ALM.

CRM 2787017100/Final Unclassified

*An Analysis of "BRASS CREEP"* (U) August 1987

DJ Cymrot, RL Peck

32pp, CNA, PML, Repository

(U) The decline in enlisted-to-officer ratio in recent years has been labeled "brass creep," which is meant to imply that the officer corps has grown too large. This research memorandum analyzes trends in the enlisted-to-officer ratio in the Navy and proposes an explanation for a recent decline in this ratio based on reasons of efficiency.

CRM 2787008200/Final Unclassified

*Final Report of the Total Force Utilization Study* (U) July 1987

JV Hall

34pp, CNA, PML, Repository

(U) Partly because of its history, partly because of the cost of military manpower in the U.S. today, the Total Force is under continuous scrutiny by the Congress. This research memorandum presents information about the Total Force on three specific topics: the historical evolution of the total force, the Navy's military manpower requirements system, and crew stability as it affects unit cohesion and readiness. It also identifies a number of issues related to Total Force planning, and describes a context in which their relative importance and urgency can be assessed.

CRM 2787007800/Final Unclassified CPR

*The Total Force Policy in Historical Perspective* (U) June 1987

PM Cronin

53pp, CNA, PML, Repository

(U) CNA's Total Force Utilization Study was chartered to support development of a Total Force Master Plan for the Navy. This research memorandum provides essential historical background for such a plan by examining how the Total Force policy, particularly as it relates to active and reserve Naval forces, has evolved since its inception nearly two decades ago.

CRM 2787007300/Final Unclassified

*Direct Program and Cost Factors for Ships and Aircraft* (U) June 1987

LT Brasher, HL Eskew, WP Mulligan

266pp, CNA, PML, Repository, No External

(U) This research memorandum contains definitions and estimates of direct program and cost factors for U.S. Navy ships and aircraft and for U.S. Marine Corps aircraft. The factors which are intended for use in navy planning and programming (but not budgeting), include operating inventories and utilization rates, personnel requirements and costs, fuel and other unit-level consumable costs, and both intermediate and depot level maintenance costs. They are computed separately for the Atlantic Fleet and the Pacific Fleet, with cost values expressed in constant FY 1985 dollars and summarized by fiscal appropriation. Various conceptual and data limitations are discussed in an effort to minimize the potential for misinterpretation and misuse of the factors.

CRM 2787006300/Final Unclassified

*Issues in Total Force Planning* (U) May 1987

JV Hall

12pp, CNA, PML, Repository

(U) Many factors affect total force Navy planning. This research memorandum examines three - the maritime strategy, external constraints, and the mobilization process - and identifies a number of issues. In addition, the paper describes a context in which the relative importance and urgency of the issues can be assessed.

CRM 2786013400/Final Confidential

*A Comparison Between the Supply of and the Demand for Navy Civilians* (U) June 1986

M Bowes, JE Thomason

922pp, CNA, PML, Repository

(U) The results of a comparison between the supply of and the demand for Navy civilians by geographic location, pay plan, and occupation are presented. The comparison was made as a part of a project designed to determine where there might be critical shortages of Navy civilians during mobilization. CNA Research Memorandum 86-131 is the final report of that project and contains the unclassified information. The classified portions of the project are reported here.

CNR 9400980100/Final Unclassified

*The Career Development of Civilian Scientists and Engineers Within the Naval Material Command - Volume I:*

*Summary* (U) November 1984

WJ Hurley, RF DeWalt, A Klotz

52pp, CNA, PML, Repository

(U) This report discusses two related aspects of civilian career development in the Naval Material Command (NMC): the need for technical expertise in the Washington headquarters organization and the need for corporate breadth among senior managers. The problem of establishing goals for career development initiatives is addressed. Desired levels of experience are compared to the actual background of the incumbents. A program to tell NMC personnel about the kinds of experience desired for senior positions, create more opportunities to acquire this experience, and offer incentives for NMC employees to take advantage of career opportunities is proposed. Volume I provides a summary of the research.

CNR 9400980200/Final Unclassified

*The Career Development of Civilian Scientists and Engineers Within the Naval Material Command - Volume II:*

*Appendixes A-F* (U) November 1984

WJ Hurley, RF DeWalt, A Klotz

204pp, CNA, PML, Repository

(U) This report discusses two related aspects of civilian career development in the Naval Material Command (NMC): the need for technical expertise in the Washington headquarters organization and the need for corporate breadth among senior managers. The problem of establishing goals for career development initiatives is addressed. Desired levels of experience are compared to the actual backgrounds of the incumbents. A program to tell NMC personnel about the kinds of experience desired for senior positions, create more opportunities to acquire this experience, and offer incentives for employees to take advantage of career opportunities is proposed. Appendixes A-F provide detailed information of the research: results of the interviews; edited texts of interviews; participant perceptions of career development programs; present structure of civilian career development; literature review; the Air Force civilian career development program; and desired experience for senior executive service (SES) positions.

CNR 9400980300/Final Unclassified

*The Career Development of Civilian Scientists and Engineers Within the Naval Material Command - Volume III:*

*Appendixes G-K* (U) November 1984

WJ Hurley, RF DeWalt, A Klotz

190pp, CNA, PML, Repository

(U) This report discusses two related aspects of civilian career development in the Naval Material Command (NMC), the need for technical expertise in the Washington headquarters organization and the need for corporate breadth among senior managers. The problem of establishing goals for career development initiatives is addressed. Desired levels of experience are compared to the actual backgrounds of the incumbents. A program to tell NMC personnel about the kinds of experience desired for senior positions, create more opportunities to acquire this experience, and offer incentives for NMC employees to take advantage of career opportunities is proposed. Appendixes G-K provide details of the research: analysis of civilian Senior Executive Service (SES) positions; experience profiles of senior technical managers; quantitative aspects of career development for scientists and engineers; alternative general approaches to career development; and a draft information pamphlet.

## Miscellaneous

CRM D0003713.A1/Final Unclassified CPR

*The Retirement Choice* (U) April 2001

AO Quester, LG Lee

19 pp, CNA, RAD, WET, Repository, Unlimited Distribution

(U) Military personnel who entered service after 31 July 1986 and who are eligible and intend to serve for 20 years must choose between two retirement plans at their 15<sup>th</sup> year of service. Once the final selection is made, the choice is irrevocable. Show Marines, Sailors, Airmen, and Soldiers decide which option to take? The Department of Defense has a website that provides information and examples to help in making the decision. At CNA, we did some calculations using a different approach that we believe is useful in evaluating these retirement choices. This research memorandum calculates the differences between the high-3 retirement plan option OR the REDUX retirement plan plus a \$30,000 bonus option that is given at the 15<sup>th</sup> year of service, in order to help service members make more informative decisions about which plan to select. Most service members who elect REDUX and the bonus will lose about \$200,000 in retirement monies.

CRM D0004368.A1/Final Unclassified

*America's Military: A Coat of Many Colors* (U) July 2001

AO Quester, C Gilroy

43 pp, CNA, RAD, WET, Repository

(U) Since the onset of the volunteer military almost 30 years ago (1973), the American full-time workforce has become more diverse, and the active-duty military reflects that diversity. This paper considers comparisons of full-time, military-age (18-44) civilian workers and active-duty military personnel in 1970 and 2000. In that 30-year period, percentages of civilian workers changed from 89 to 70 percent white, from 10 to 12 percent black, and from 1 to 18 percent other racial categories the active-duty military population between 1970 and 2000 are comparable: from 83 to 65 percent white, from 11 to 20 percent black, and from 6 to 14 percent other racial/ethnic backgrounds. The percentage of women in the military increased from 2 to 15 percent. The paper also looks at the gender and race/ethnic composition of the senior enlisted and officer leadership. It compares the gender and race/ethnic composition of today's leadership with the gender and race/ethnic composition of their accession cohorts. The overall finding is that women and minorities are better represented in today's senior leadership than they were in their accession cohorts.

CRM D00030332.A1/Final Unclassified

*Final Report: Street-to-Fleet Study, Volume I: Street-to-Fleet for the Enlisted Force* (U) February 2001

AO Quester and TH Kimble

83 pp., CNA, RAD, WET, Repository

(U) The Marine Corps lacked historical accession-based files for both enlisted personnel and officers. For the enlisted side, in this study CNA developed both a historical SSN-based accession file and two databases that are Windows NT compatible. These databases begin with FY 1979 accessions, are called MCAR (Marine Corps attrition reasons) and MCAID (Marine Corps attrition interactive database). The interactive databases allow the user to examine non-end-of-active-service (non-EAS) attrition through 72 months of service. This paper describes these databases, as well as presenting examples of analytic work done with them.

CRM D00030333.A1/Final Unclassified

*Final Report: Street-to-Fleet Study, Volume II: Street-to-Fleet for Commissioned Officers* (U) February 2001

AO Quester and CM Hiatt

45pp., CNA, RAD, WET, Repository

(U) The Marine Corps lacked historical accession-based files for both enlisted personnel and officers. For the officer side, in this study CNA developed both a historical SSN-based file (Marine Corps Commissioned Officer Accession Career, MCCOAC), as well as a beta version of a smaller Windows NT compatible database. MCCOAC is an event-based file that begins at TBS (1980). For each record the file contains TBS information, information from the first HMF record, information from augmentation, information when the officer is PMOS-qualified and at his first duty station, information about promotion(s), and separation information. The memorandum describes the files.

CAB 4799011600/Final Unclassified CPR

*MC 2M/ATE MOS Study: Final Report* (U) September 1999

GS Sicilia, DA Adams, D Gregory, JP Hall, MY Katz, TC Nguyen, HT Pham

70pp, CNA, RAD, Repository

(U) This briefing summarizes the findings and conclusions resulting from the CNA Marine Corps Microminiature/Automatic Test Equipment Military Occupational Specialty Code (2M/ATE MOS) study. The purpose of the study was to analyze a number of alternative Circuit Card Assemblies (CCA) repair strategies for MC ground systems. The alternatives considered ranged from evacuating all CCA functions to repairing them all. We also considered varying the repairer workforce composition and repair location. We found that the current repair practices, assuming that the MC assigns the number of repairer man-years we estimate are needed, saves about \$75 million a year over what it would cost of evacuate and replenish failed CCAs. More money could be saved if all CCAs were repaired at a central location (Electronic Maintenance Companies). The report also finds that 2M workload does not appear to warrant a primary MOS.

CAB 4798005010/1Rev Unclassified

*USMC Readiness: Potential Indicators* (U) June 1998

AM Jareb, DM Roepke

40pp, CNA, SPM, Repository

(U) This briefing provides an interim report on the examination of readiness data, readiness indicators, and the state of Marine Corps readiness, as part of the ongoing study of Marine Corps readiness trends and development of summary readiness indicators. The briefing discusses the data in developing summary indicators in the three areas of personnel, equipment, and other readiness measures including the Status of Resources and Training System (SORTS).

CAB 0597034600/Final Unclassified

*Marine Corps Scheduled Deployment Database (MCSKED)* (U) March 1997

AO Quester, ME MacIlvaine, DL Reese, BL Butter

54 pp, CNA, SPM, Repository, Briefing

CRM 2796011800/Final Unclassified

*Final Report: Evaluating the Impact of Pregnancy and Other Medical, Administrative, and Disciplinary Factors on Marine Corps Personnel Deployability and Unit Readiness* (U) December 1996

AO Quester, ME MacIlvaine, BP Intoy, BL Butters, TH Kimble, DL Reese

112pp, CNA, SPM, Repository

CRM 2795013200/Final Unclassified

*Civilian Scientific and Engineering Employment: Projections and Policy Options* (U) September 1995

DD Goldhaber, KS Lawler

55pp, CNA, SPM, Repository

(U) The reduction in military budgets in the post-Cold War era has put pressure on the Navy's Research, Development, Test, and Evaluation (RDT&E) centers - the civilian laboratories - to downsize the number of civilian employees working in these centers. Starting in 1990, the Secretary of the Navy instituted a number of hiring restrictions that led to a significant decrease in the number hiring rate relative to the level of the late 1980s. A potential problem for the Navy is that the hiring restrictions have resulted in demographic changes that threaten the long-term health and effectiveness of the RDT&E centers. Of particular concern to the laboratory directors is the marked decrease in the number of younger technical personnel (Scientists and Engineers (S&Es)), generally characterized as age 30 or younger, employed at the laboratories. This study reexamines the historical trends in S&E hiring from 1988 to 1994, focusing on demographic shifts of a variety of employee characteristics, including age, overall job market experience, and current job tenure. Essentially, we seek to help the Navy assess whether the current reduction in hiring has resulted in an experience mix that threatens to compromise the technical abilities of the Navy's RDT&E centers. Further, we project the future demographic consequences of the continued drawdown, and what policies may be implemented to prevent the downsizing of the Navy's civilian force from causing a loss of its technical edge.

CAB 4794006500/Final Unclassified

*Counting PERSTEMPO--Which Beans to Count? A Briefing by RAdm. Dan Oliver to the CINCs' Conference, 11 October 1994* (U) October 1994

G Akst, LC Cavalluzzo, AR Zeman

24pp, CNA, RAS, Repository

(U) The fundamental issue examined in this briefing is whether there is any difference between the PERSTEMPO reported for units and the PERSTEMPO experienced by the sailors in those units. What "bean" is better for measures of PERSTEMPO--such units as ships, submarines, and squadrons, or individual sailors? CNA did this work as quick-response study for N81. The study originated from a task from the CINC's Conference on 24 August 1994. The briefing is in three parts: First, we examine how standard PERSTEMPO measures, when applied to individuals, compare to the usual methods of applying them to units (ships, squadrons, etc.). We next explore the issue of cross-decking, and investigate trends over the past few years. And finally, we examine how the other services do business.

CRM 2792010000/Final Unclassified

*Determining the Optimal Repair Requirements for New Marine Corps Avionics Test Equipment* (U) August 1992

RA Levy, RL Miller

49pp, CNA, OPS, Repository, Limited External

(U) The Marine Corps will most likely use some version of the Navy's new Consolidated Automated Support System (CASS) for repairing F/A-18, AV-8B, and AH-1W avionics components and subcomponents. The Marine Corps wants to know, on the basis of cost, which specific avionics components should be tested and repaired locally on CASS, or, if feasible, on the CASS portable test set. In addition, the Corps wants to know how CASS will affect mobility requirements, as measured by the number of maintenance and supply vans that are needed to support its aircraft. To determine the component candidates for local repair, as well as the number and types of CASS benches that the components will be tested on, we incorporated the important life-cycle support costs in CNA's avionics repair cost-minimization.

CRM 2787000500/Final Unclassified

*Personnel Turnover in the Navy's Operating Forces* (U) January 1987

KN Domabyl, AJ Marcus, JE Thomason

184pp, CNA, PML, Repository

(U) Turnover rates of personnel are measured for U.S. Navy ships and two types of aircraft squadrons. Comparisons are conducted across ship types, over time, and by phases in the employment cycle.

CRM 2785003300/Final Unclassified CPR

*A Model for Drug Testing* (U) August 1985

PJ Evanovich

23pp, Repository

(U) To make a drug-testing program successful and to minimize the cost of the program, the minimum number of tests that must be given in a specified period to identify a fixed percentage of drug users must be determined. This memorandum presents a Markov model that can be used to determine the number of tests that should be given. In addition, three applications of the model, showing how it can be used to analyze the drug-user population, are presented.

## Scientific Analyst Memorandums

CME D0004701.A1/Final Unclassified

*Early Separations Versus Long-Term Retention of Male and Female Marines* (U) September 2001

AO Quester

5pp, CNA, RAD, WET, Repository

CME D0004478.A1/Final Unclassified

*FTAP: We're Retaining Our Best!* (U) August 2001

AO Quester

2pp, CNA, RAD, WET, Repository

CME D0004456.A1/Final Unclassified

*Desertion and Deserters : What's Going On?* August 2001

AO Quester

6pp, CNA, RAD, WET, Repository

CME D0004311.A1/Final Unclassified

*Meritorious Promotions and Enlistment Waiver Status* (U) July 2001

AO Quester

2pp, CNA, RAD, WET, Repository, Limited External

CME D0004237.A1/Final Unclassified

*Officer Mental Aptitude* (U) June 2001

AO Quester

4pp, CNA, RAD, WET, Repository

CME D0004096.A1/Final Unclassified

*Updating Estimates of Selective Reenlistment Bonus (SRB) for FY 2002 Planning* (U) June 2001

AO Quester

4pp, CNA, RAD, WET, Repository

CME D0003698.A1/Final Unclassified

*USMC Officer Recruiting Structure Quick Response Study: Progress Report* (U) April 2001

A Jareb, L Parker

1p, CNA, ISO, OTT, Repository

CME D0003323.A1/Final Unclassified

*Why Not Have 24-Month Tours for Marines Serving in WESTPAC?* (U) February 2001

LG Lee, AO Quester

4pp, CNA, RAD, WET, Repository

CME D0003136.A1/Final Unclassified

*Retirement Choices for Servicemen or Women Who Entered After 31 July 1986* (U) January 2001

LG Lee, AO Quester

7pp, CNA, RAD, WET, Repository

CME D0003069.A1/Final Unclassified

*History of the Crucible* (U) December 2000

AO Quester, LG Lee

5pp, CNA, RAD, WET, Repository

CME D0002729.A1/Final Unclassified

*Long-Term Retention of Male and Female Marines* (U) October 2000



LG Lee, AO Quester  
2pp, CNA, RAD, WET, Repository

CME D0002306.A1/Final Unclassified  
*Marines Separated With 10 or More Years of Service: An Update* (U) September 2000  
AO Quester  
6pp, CNA, RAD, WET, Repository

CME D0001779.A1/Final Unclassified  
*Can We Reduce the Number of Career Marines in Base/Station Billets?* (U) July 2000  
JH North  
7pp, CNA, RAD, INF, Repository

CME D0001867.A1/Final Unclassified  
*Marine Corps Recruiting Command Strategy Conference March 2000* (U) July 2000  
A Jareb  
11pp, CNA, ISO, OTT, Repository

CME D0001615.A1/Final Unclassified  
*Analysis of WRR District Structure Alternatives* (U) June 2000  
A Jareb  
3pp, CNA, ISO, OTT, Repository

CME D0001624.A1/Final Unclassified  
*Some Thoughts on Retention* (U) June 2000  
A Jareb  
5pp, CNA, RAD, WET, Repository

CME D0000477.A1/Final Unclassified  
*June, July, August, September (JJAS) Accessions: Preparing for a Possible Problem* (U) February 2000  
AO Quester  
0pp, CNA, RAD, WET, Repository

CME D0000229.A1/Final Unclassified  
*Navy Boot Camp Attrition Rates: Some Good News* (U) January 2000  
AO Quester  
4pp, CNA, RAD, WET, Repository

CME D0000026.A1/Final Unclassified  
*Marines in Combat Arms Occupations: Are we Losing Too Much of Our Teeth?* (U) January 2000  
AO Quester, LG Lee  
3pp, CNA, RAD, WET, Repository

CME D0000273.A1/Final Unclassified  
*Regular Accessions and MCRD Attrition in FY 2000* (U) January 2000  
AO Quester  
3pp, CNA, RAD, WET, Repository

CME D0000025.A1/Final Unclassified  
*Marriage in the Marine Corps* (U) January 2000  
AO Quester  
5pp, CNA, RAD, WET, Repository

CME 0599112700/Final Unclassified  
*Assignments, Rotation Base, and Quality of Life for Our Career Marines*

(U) October 1999

AO Quester

3pp, CNA, RAD, Repository, Limited External

CME 0599089900/Final Unclassified

*Good News on the Post-Bootcamp Attrition Rates for Crucible- Trained Marines* (U) August 1999

AO Quester

3pp, CNA, RAD, Repository

CME 0599080600/Final Unclassified

*First Term Non-EAS Attrition in The Marine Corps* (U) July 1999

AO Quester

2pp, CNA, RAD, Repository, Limited External

CME 0599053200/Final Unclassified

*Updating Estimates of Selective Reenlistment Bonus (SRB) for FY 2000 Planning* (U) May 1999

AO Quester

3pp, Repository, Limited External

CME 0599042700/Final Unclassified

*Boot Camp Attrition and February, March, April, May (FMAM) Shipping Bonuses* (U) April 1999

AO Quester

4pp, CNA, SPM, Repository

CME 0599036700/Final Unclassified

*What Do We Know About the Impact of Participation in the Delayed Entry Program (DEP) on Subsequent Attrition*

(U) April 1999

AO Quester

11pp, CNA, SPM, Repository, Limited External

CME 0599031600/Final Unclassified

*Implications for Base Structure of Outsourcing of Functions* (U) March 1999

JH North

5pp, CNA, OPS, Repository

CME 0599021100/Final Unclassified

*Resources to Readiness Study: Readiness Indexes* (U) January 1999

AM Jareb, DM Roepke, EM Damm, MM Macilvaine, HT Pham

44pp, CNA, SPM, Repository, Limited External

CME 0599008800/Final Unclassified

*More on Tooth to Tail* (U) January 1999

AO Quester

3pp, CNA, SPM, Repository, Limited External

CME 0599006100/Final Unclassified

*Transition of the Career Force Inventory to Meet Career Force Requirements* (U) January 1999

AO Quester

3pp, CNA, SPM, Repository, Limited External

CME 0599003500/Final Unclassified

*Enlistment Waivers, Educational Background, and Attrition From the Marine Corps: Female Accessions* (U)

January 1999

AO Quester

8pp, CNA, SPM, Repository, Limited External

CME 0598161900/Final Unclassified  
*Enlistment Waivers, Educational Background, and Attrition from the Marine Corps: Male Accessions* (U) January 1999  
AO Quester  
15pp, CNA, SPM, Repository, Limited External

CME 0598122600/Final Unclassified  
*Racial and Ethnic Background of Marines* (U) September 1998  
AO Quester  
7pp, CNA, SPM, Repository, Limited External

CME 0598117900/Final Unclassified  
*Some More on the Marriage Rate: Comparisons With the Civilian Population* (U) September 1998  
AO Quester  
2pp, CNA, SPM, Repository, Limited External

*Informal Review of GAO Draft Report on Attrition* (U) August 1998  
AO Quester  
2pp, CNA, SPM, Repository

CME 0598102400/Final Unclassified  
*Married Marines: Some Good News in the Recent Trends* (U) August 1998  
AO Quester  
3pp, CNA, SPM, Repository

CME 0598087000/Final Unclassified  
*Tabulation of Marines in FMF and Non-FMF, by Grade* (U) July 1998  
AO Quester  
3pp, CNA, SPM, Repository

CME 0598060900/Final Unclassified  
*Hispanic Recruits* (U) May 1998  
AO Quester  
5pp, CNA, SPM, Repository

CME 0598089000/Final Unclassified  
*How Is Labor Distributed Among The Base Functions And What Is The Total Cost By Function?* (U) March 1998  
JH North  
6pp, Repository, No External

CME 0598034300/Final Unclassified  
*When Do Marines Get Married?* (U) March 1998  
AO Quester  
3pp, CNA, SPM, Repository

CME 0598025200/Final Unclassified  
*Calculating Bootcamp Attrition* (U) February 1998  
AO Quester  
16pp, CNA, SPM, Repository

CME 0597150800/Final Unclassified  
*Recruits With Home Study as an Educational Certification: A Proposed Experiment to Determine the Success of this Population in the Marine Corps* (U) November 1997  
AO Quester  
5pp, CNA, SPM, Repository

CME 0597115800/Final Unclassified  
*Update on CNA Work on Non-EAS Attrition (U)* September 1997  
AO Quester, AM Jareb  
30pp, CNA, SPM, Repository, Briefing

CME 0597102200/Final Unclassified  
*Final Memorandum on CNA Contributions to the Reserve Force Structure Review (U)* August 1997  
JJ Nelson, JT Dworken, AM Jareb  
9pp, CNA, OPS, Repository

CME 0597091100/Final Unclassified  
*Different Ways To Sustain a First-Term Enlisted Force of 103, 500 Marines (U)* July 1997  
AO Quester  
4pp, CNA, SPM, Repository

CME 0597068400/Final Unclassified  
*A Quick Look at CNA Analyses: Recruiting and MCRD Issues (U)* May 1997  
AO Quester, AM Jareb, BP Intoy  
25pp, CNA, SPM, Repository

CME 0597059000/Final Unclassified  
*Bootcamp Attrition: Company B at MCRD SD, for Recruits Arriving 8-10 April 1996 (U)* May 1997  
AO Quester  
2pp, CNA, SPM, Repository

CME 0597058400/Final Unclassified  
*Bootcamp Attrition by Training Days Completed (U)* May 1997  
AO Quester, AM Jareb  
4pp, CNA, SPM, Repository

CME 0597042700/Final Unclassified  
*U.S. Infantry Surprise: It's Now Mostly White; Blacks Hold Office Jobs, Wall Street Journal, 6 January 1997 (U)*  
March 1997  
AO Quester  
4pp, CNA, SPM, Repository

CME 0597034600/Final Unclassified  
*Marine Corps Scheduled Deployment Database (MCSKED) (U)* March 1997  
AO Quester, ME MacIlvaine, DL Reese, BL Butters  
54pp, CNA, SPM, Repository

CME 0597024900/Final Unclassified  
*Tuition Assistance Program (TAP) for Platoon Leaders Class (PLC) (U)* February 1997  
AO Quester, DD Goldhaber  
5pp, CNA, SPM, Repository

CME 0597018000/Final Unclassified  
*An Update on FY 1995 Recruits Who Tested Positive for Drugs at the MCRDs (U)* February 1997  
AO Quester  
3pp, CNA, SPM, Repository

CME 0597015700/Final Unclassified  
*Some Notes on Current Attrition Patterns (U)* February 1997  
AO Quester  
10pp, CNA, SPM, Repository

CME 0596181600/Final Unclassified

*Why the Fleet Assistance Program (FAP) May Be Good for the Marine Corps* (U) December 1996

AO Quester

4pp, CNA, SPM, Repository

CME 0596174500/Final Unclassified

*Scoring Matrix for the New Female PFT* (U) December 1996

AM Jareb

12pp, CNA, SPM, Repository, Limited External

CME 0596179800/Final Unclassified

*How Improvements in the Quality of Marine Corps Recruits Have Affected First-Term Attrition: A Historical Look* (U) December 1996

AO Quester

8pp, CNA, SPM, Repository

*Fleet Follow-Up for FY 1995 Recruits Who Tested Positive for Drugs at the MCRDs* (U) November 1996

AO Quester

2pp, CNA, SPM, Repository

CME 0596148800/Final Unclassified

*Length of the First-Term Enlistment Contract: The Marine Corps Compared to Other Services* (U) October 1996

AO Quester

2pp, CNA, SPM, Repository

CME 0596148500/Final Unclassified

*Non-EAS Attrition by Race/Ethnic Status* (U) October 1996

AO Quester

3pp, CNA, SPM, Repository

CME 0596139200/Final Unclassified

*Meeting or Not Meeting "Weight-for-Height" Retention Standards at Accession: Recent Attrition Statistics for Non-Prior-Service Regular Male Recruits* (U) September 1996

AO Quester

2pp, CNA, SPM, Repository

CME 0596136300/Final Unclassified

*Out-of-Pocket Expenses for Families on Housing Allowances* (U) September 1996

AO Quester

2pp, CNA, SPM, Repository

CME 0596125700/Final Unclassified

*Enlisted Women and Minorities: A Retention Success Story* (U) August 1996

AO Quester

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